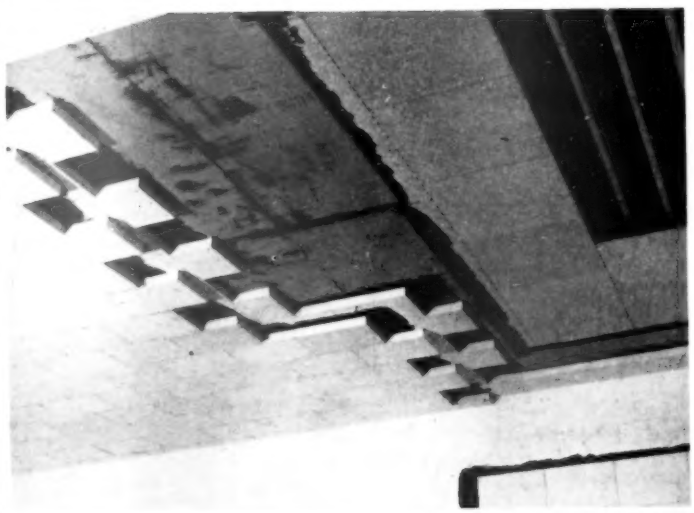
Modern Refrigeration & Air Control

62 No. 737 AUGUST, 1959 Price 2s. 6d. monthly

Styrocell

– the ideal insulation material



Styrocell board supplied through Cork Growers Trading Co. (1931) Ltd., has been used to insulate two cold stores built for Eskimo Foods Limited at Cleethorpes. These cold stores, each of approx. 825,000 cu. ft. capacity, are among the largest in the country.

The photograph is of a stage in the application of the roof insulation, showing layers of Styrocell board, the chip-board ceiling and the Kraft-backed aluminium foil vapour seal.

SHELL

SHELL CHEMICAL COMPANY LIMITED

for Domestic or Commercial use

Silvyan
(REG'D)

A universal Serviceable *Sealed Unit*

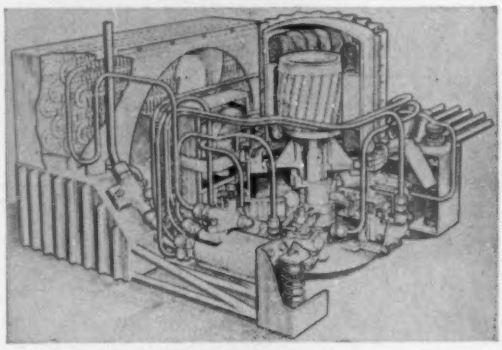
with UNIQUE *features*

★ LOWER TEMPERATURE MEANS REAL DEEP-FREEZE

★ OBVIATES PRE-COOLING AND SECONDARY CIRCUITS

★ WIDE VERSATILITY

★ DESIGNED FOR LONG LIFE WITH FREON 22



British Patent
UK 680922

Australian Patent
154195

U.S.A. Patent
2738122

New Zealand Patent
105246

While having the advantages of effective "Sealing" this Unit offers every facility for complete testing, maintenance or repair on the spot by ordinary Service Engineers using simple tools. Costly periods of enforced idleness are thus avoided. A special feature of the design is the interlock of main casings, giving exceptional rigidity, and long, trouble-free life. Readily adaptable to a wide variety of mountings it provides an efficient component, as original or replacement, over a large field of operation.

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APPLICATIONS ENGINEER with experience of sealed systems and automatic plant of up to 20 h.p. capacity. Good salary and prospects. Apply to Kelvinator Ltd., Great West Road, Chiswick, W.4. 1293

FIRST CLASS Service Engineer required for Berks., Bucks., Hants. Must be thoroughly experienced, highest rates, commission, and accommodation if required to right man. 1290

FULLY experienced domestic and commercial refrigeration engineer required for London and North London area. Must be able to quote for all types of installations. Progressive position for suitable applicant. Write Box 1302. 1302

INSULATION. Works Manager required by South Lancashire Insulating Contractors manufacturing cabinets, cold rooms and display cases. Reply stating age and experience to Box 1296. 1296

REFRIGERATION ENGINEER for Jamaica. Apply with full details to Box 1292. 1292

REFRIGERATION Engineers required for erection and maintenance of Industrial Freon Refrigeration Plant of our own manufacture. Range 3 - 50 TR. Permanent Salaried position - Top salaries paid with additional Efficiency Bonus paid every three months. Transport supplied. In first instance apply in writing, or by telephone (Tel. No: Molesey 4406) for an interview, stating experience and age to Alfred Porter & Co. Ltd., Stella Works, Stanley Road, Teddington, Middx. 1281

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REFRIGERATION Service Engineer required by Kelvinator distributor south coast area. Must be fully experienced. Excellent prospects, pension scheme, pleasant territory. Apply with full details to Cool-Rite Ltd., Kelvinator House, Poole Road, Westbourne, Bournemouth. 1258

SERVICE Engineer, Surrey area. Applicant fully experienced, preferably with own transport. Good prospects. - Universal Cooler Ltd., 8 West Street, Dorking. Telephone: Dorking 4555. 1250

SENIOR Mechanical Draughtsman required familiar to contract work and capable of handling projects with the minimum of supervision. Preferable experience in the air conditioning and refrigeration industry; but this need not be essential. Top salary with good prospects. Write in first instance giving full particulars which will be treated in strict confidence, to: Alfred Porter & Co.Ltd., Stella Works, Stanley Road, Teddington, Middx. 1299

ARTICLES WANTED

REQUIRED Cold Room approximately 14' 6" maximum by 23' 6" (or two, each 14' x 12' would do) insulated equivalent minimum 8" cork. Box 1295. 1295

REQUIRED two evaporators capable of dealing with 54,000 B.T.Us. each at -5° F. with 10° temperature difference or equivalent. Box 1294. 1294

SECOND-HAND L.D. Wood Model '271' Ice Cream Conservator required, preferably Frigidaire equipped. Write, stating condition and price to Box 1297. 1297

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REFRIGERATION COMPRESSORS. Several two-stage by Hall and Sterne's, complete motors. Several 6 in. x 6 in., by Hall, Sterne's, Lightfoot; 5 in. x 5 in. Hall, York, G. & J. Weir; 4 in. x 4 in., York, Hall, Sterne's, Weir, Lightfoot, "Freon" VT7 10 h.p. and 7½ h.p., also 3, 4, 5, and 7½ h.p. "Freon" Compressors by Sterne's, York, Hall, etc. Large stockists. Keenest prices in the trade. Export orders receive special attention. Send in your enquiries. - Alfred's Ices (1954) Ltd., 1-5 Hall Place, Church Street, London, W.2. Telephone: PADdington 6619/6610. Telegrams: ICEFRIGO LONDON, W.2. 830

REFRIGERATION. One Douglas twin cylinder compressor 5" bore complete with 20 h.p. electric motor, and complete automatic starting gear. The whole has been in use for three years. Apply to: Dairy cont'd

Manager, Plymouth Co-Operative Society, Radnor Dairy, Radnor Place, Plymouth. 1300

16" x 10" York Shipley Compressor with 100 h.p. Crompton Parkinson motor and starter. Several Compressors from 5 h.p. to 50 h.p. Several Condensers, ammonia and Freon Coils, valves, flanges, etc. Electric Motors, hand and automatic starters. E.J. Fox, 29 St. John's Road, Wallasey, Cheshire. Tele: Wallasey 3474. 1291

AGENCIES REPRESENTATIVES etc.

WEST AFRICA Refrigeration Service Concern open for Agencies, Sales and Contracts for Installations, Maintenance of all types of Domestic, Commercial, Industrial and Marine Refrigeration and Air-Conditioning. Highly skilled and experienced Staff and Management. Write Box 1289. 1289

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COLDSPOT units, quick and efficient overhauls, guaranteed work. Crates available for transporting. - Backhouse, Westmead, Woodhall, Stanningley, Leeds. 1244

"HOMEFREEZE" ice lollie packs for domestic refrigerators and all types of aluminium ice-lolly moulds. Prices and trade discounts from the manufacturer. - R.G. Harsant, 65 New Road, Ware, Herts. 1182

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This brilliantly designed 13 cu. ft. capacity bottle cooler stores a large number of bottled minerals, beers or fruit juices and has lavish ice-making capacity, yet takes up the minimum of floor space. Fully adjustable shelves get the utmost from every cubic inch of capacity.

EXTERNAL MEASUREMENTS: Height 70½"; Width 30"; Depth 27".

UNIT: Lec hermetically sealed murmur-quiet Vertimetic unit with very low power consumption, guaranteed 5 years.

CABINET: All steel chromate etched primed, finished with 'Lec De Luxe' high-bake synthetic enamel. Warranty, 1 year.

PRICE: £106.10.0

plus a minimum installation and 12 months' service fee £4 10s. 0d.

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Please send full details of the Lec Bottle Cooler and other commercial refrigerators.

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When is a door not a door
The "MINIVEIL" air curtain permits the cold store door to remain open for prolonged periods, giving completely free passage for men and goods, with a negligible rise in store temperature. This is achieved by a controlled curtain of air over the outside of the door-opening the whole time the insulated door is open.
No longer need you bother about the constant opening and closing of cold-room doors or the proper operating of air locks by the coldroom staff. You can rely on the protection afforded by the curtain of air provided by a "MINIVEIL" unit.
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Let us help you
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The Minikay System keeps new insulation permanently dry and dries out existing wet insulation.
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The Minikay System extends the life of your cold store to that of normal buildings.
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For Efficient COLD STORAGE Operation
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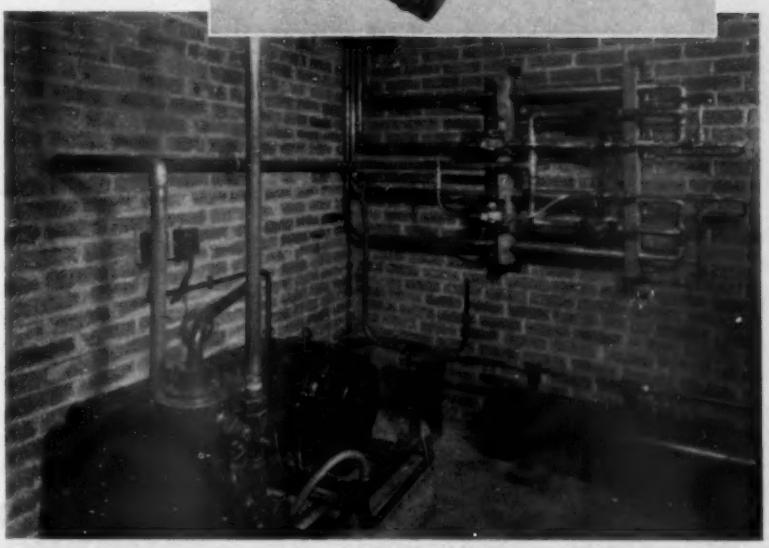
LIGHT GAUGE COPPER AND COPPER-ALLOY TUBES and "YORKSHIRE" CAPILLARY FITTINGS

for refrigeration and air-conditioning plant

" Yorkshire " Capillary Fittings, incorporating tin-silver solder rings, are especially suitable for joining copper and copper-alloy tubes operating at low temperatures in refrigeration and other services.

They incorporate, as an integral part of the fitting, the correct amount of solder for making quick, sound and trouble-free joints which are proof against seepage by refrigeration gases and other fluids under pressure.

The appearance of a complete ring of solder at the mouth of the fitting is visual proof of a sound and reliable joint.



Pipework arrangement—incorporating " Yorkshire " Fittings—in compressor room at the Birtley Factory of Messrs. Kraft Foods Ltd. (installation by Messrs. L. Sterne & Co. Ltd.)

YORKSHIRE IMPERIAL METALS LIMITED

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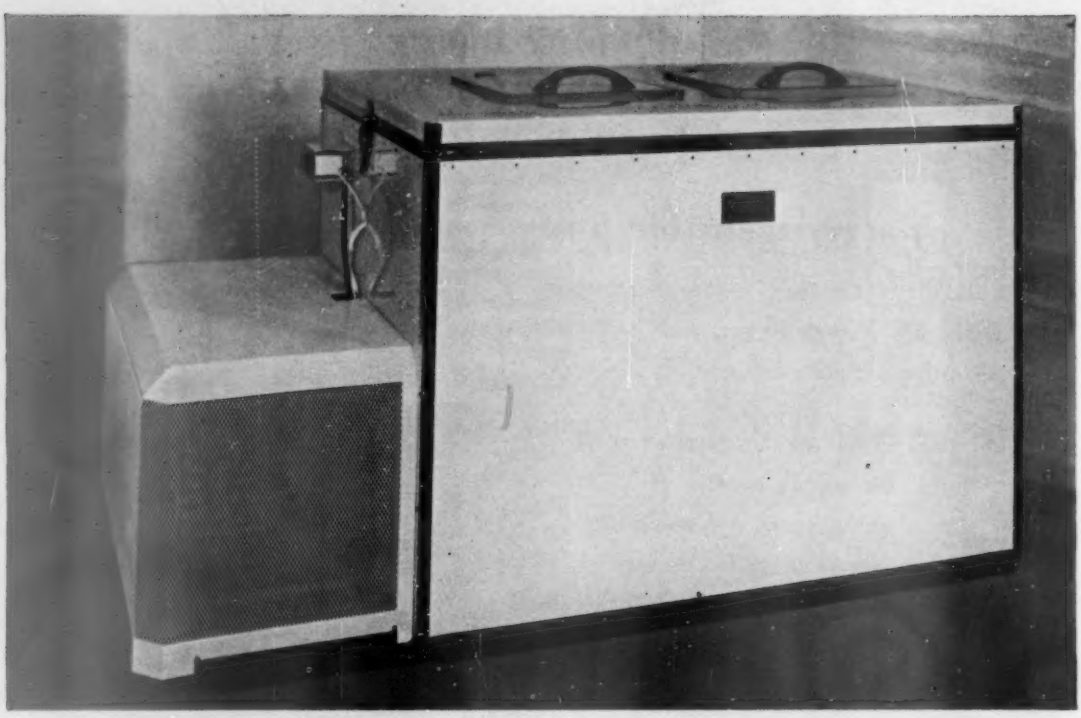
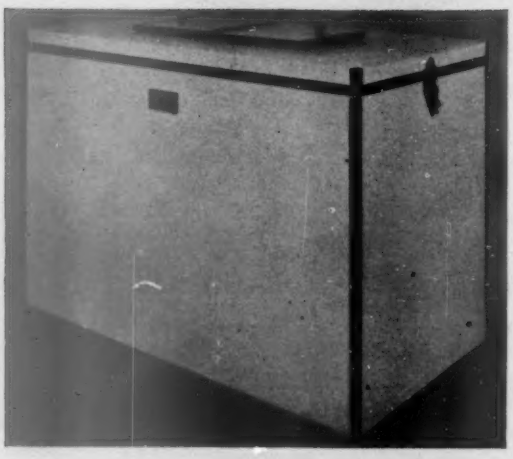


Conserve ice cream with 'Darvic' p.v.c. sheet



Hold-over cabinets for conserving ice cream faced with 'Darvic' and made by Alexander Battye (Battifreeze) Ltd., Leeds.

HOLD-OVER CABINETS for conserving ice cream made by Alexander Battye (Battifreeze) Ltd., Leeds, are faced with 'Darvic' p.v.c. sheets.

'Darvic' is an ideal material for use with food because it is absolutely hygienic; it will not taint food or drink and is completely odourless. 'Darvic' is easy to shape and is widely used in the manufacture of refrigerators and refrigerated cabinets. 'Darvic' is an excellent material for one-piece shapings for refrigerator interiors and it is used for making crisper trays and a wide range of other components.

'Darvic' has many outstanding properties, among which are high impact strength, resistance to corrosion and low thermal conductivity. It is a light material, but tough, and is rigid even in thin sheets.

A range of attractive colours is available which includes multi-colour laminates.

'DARVIC'

'Darvic' is the registered trade mark for the rigid p.v.c. sheet made by I.C.I.

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ICI

PD. 56

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by STERNE

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EQUIPMENT SUPPLIED AND INSTALLED FOR ALL TYPES OF REFRIGERATED TRANSPORT

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There's a job-matched Ranco Control for every domestic refrigerator

From Ranco's Scottish factory you can obtain an S.A. control ideally matched to any domestic refrigerator. Ranco offer a wide range of basic units which, with the many accessories, mounting brackets and numerous modified versions provide every customer with a perfectly job-matched control. The S.A. series, specially designed for compact mounting within the insulation, are particularly suitable for long, trouble-free service on household refrigerators, conservators, deep freezers, display cases, blood storage and many other applications where regular servicing will be unlikely.

These models are available with alarm circuits, and are available with either screwed or push-on terminals.

" S.A. 12 " CONSTANT CUT-IN CONTROL. Basically similar to the standard " S.A." control, the " S.A. 12 " incorporates an additional feature for DUAL EVAPORATOR applications. The cut-in temperature remains constant, irrespective of knob setting, the dial knob affecting the cut-out setting only.

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Information, specifications and advice on the application of the RANCO S.A. series controls to domestic refrigerators from Ranco Ltd.

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refrigeration
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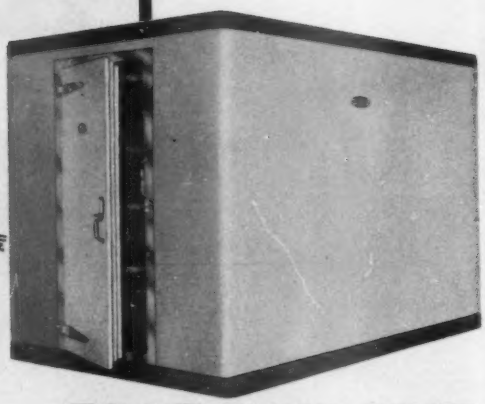
ECONOMICAL

Good Refrigeration is never expensive, though second-rate equipment usually proves to be a poor bargain indeed. Frozt-ed-Aer equipment has the reputation of being well designed and well built from the finest materials. Above all, it is known to be completely reliable. That is why famous firms buy wisely when they specify Frozt-ed-Aer.

Please write stating your business.

Applications for agencies invited.



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Automatic
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Phone: STOckpor: 7271-2-3 Grams: "Crowtool", Reddish

CR. 354

for protection against

the COLD . . .

see that they wear a

J.C.P. FRIDGE SUIT

HIGH QUALITY — LOW PRICE

- **Suits made to individual requirements**
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For Refrigeration parts large or small . . .

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This is the telephone number of one of the largest suppliers of refrigeration controls in this country.
We have also a technical department which is ready to advise you on any refrigeration problems you may have.

When in difficulties ring Abbey 5841-4

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Complete range of controls for refrigeration plant

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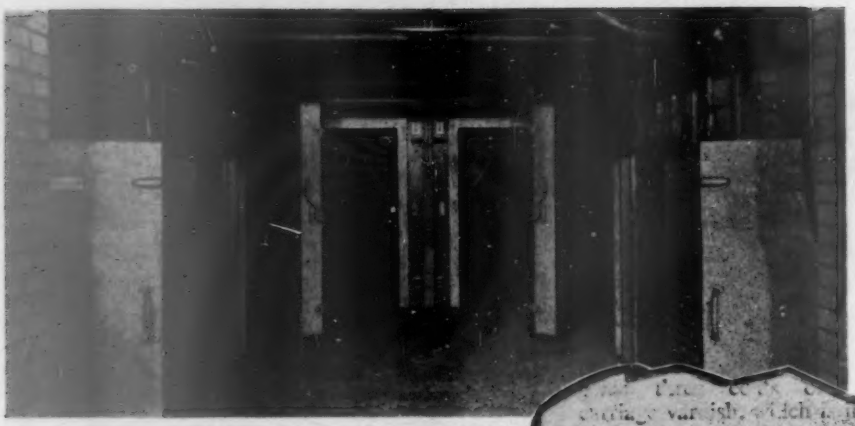
CONDENSING UNITS · REFRIGERANT CYLINDERS · FLARING TOOLS · ICE-MAKING EVAPORATORS · FLARE NUTS



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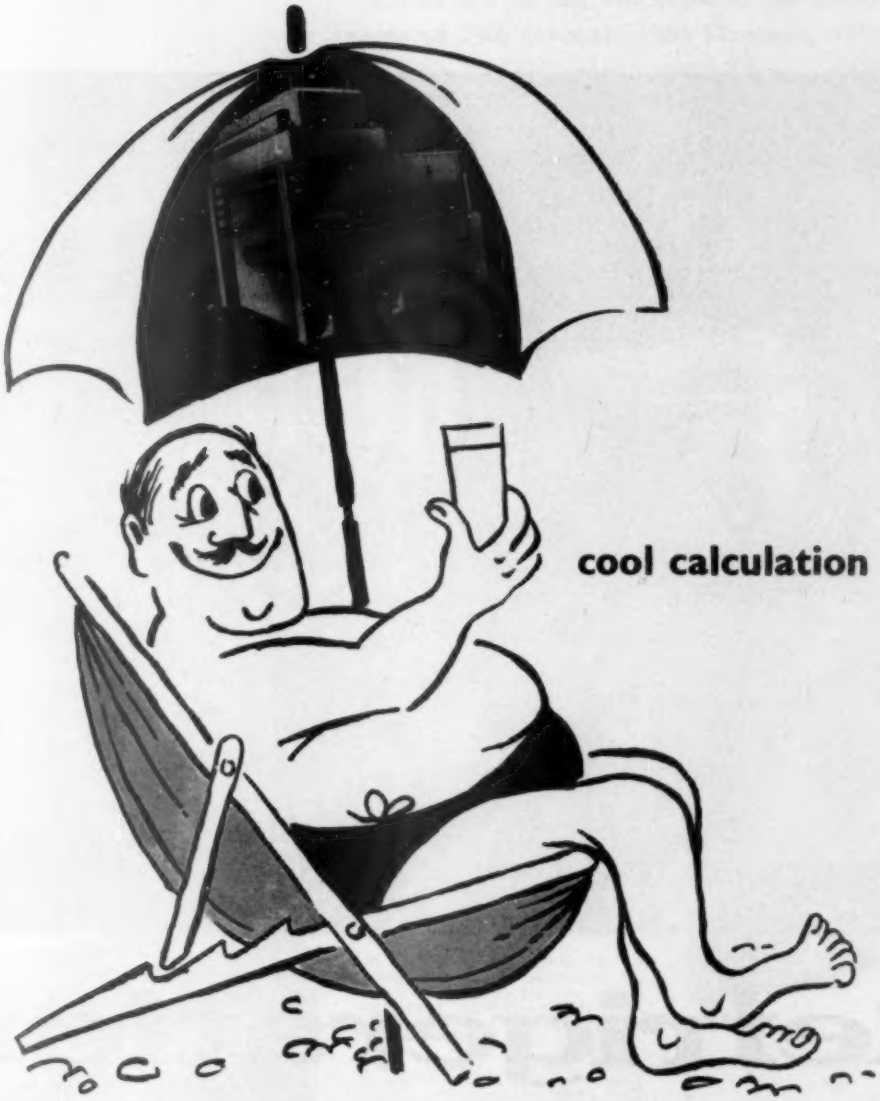

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Sandwich elements heat one sheet while another is being formed. The heated sheet is automatically transferred to the drape position as the empty frame returns to the loading and heating position. No waiting for sheets to be heated virtually doubles refrigerator liner output.

DANIELS—*World's most advanced vacuum forming machines*

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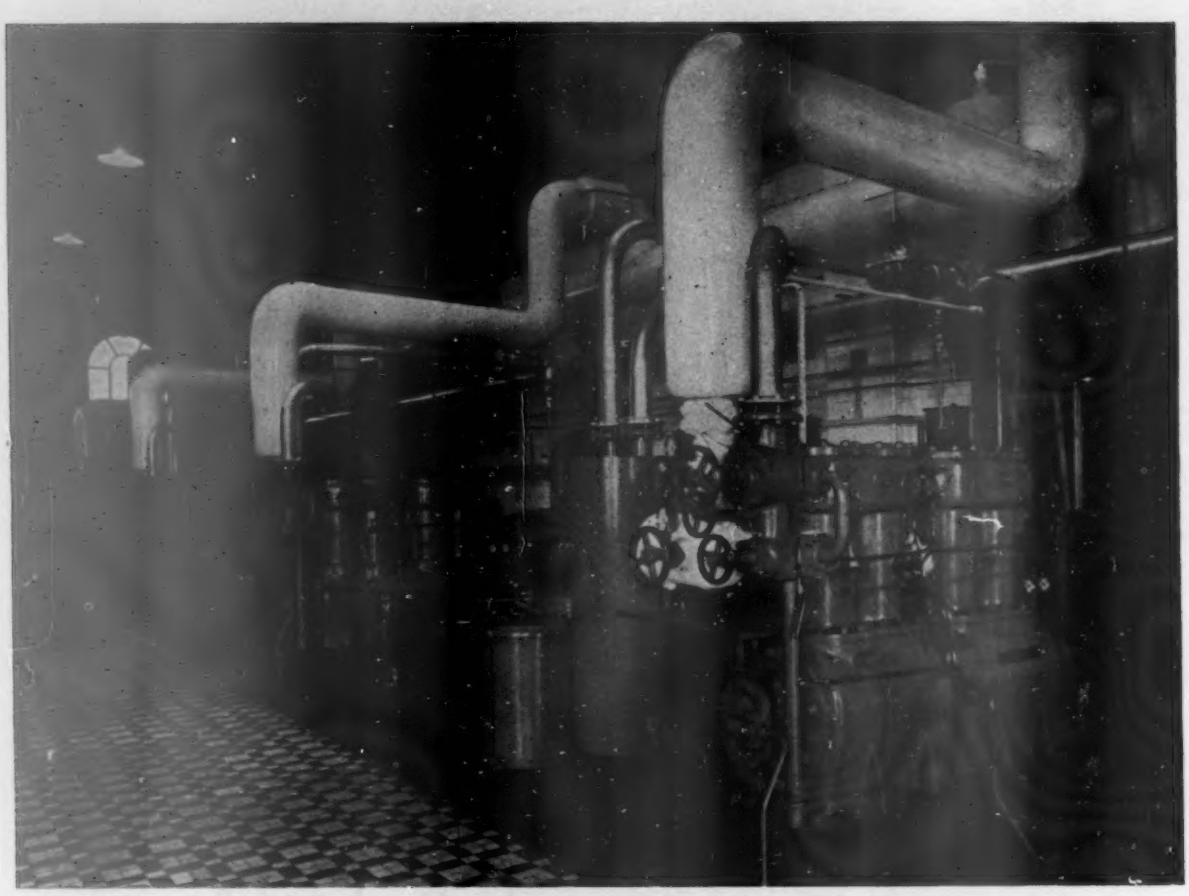

Refrigeration

Refrigerating compressors of the monobloc type are widely used in the manufacture and storage of foodstuffs. This installation comprises four 8″ x 8″ quad and an 8″ x 8″ twin monobloc compressor, driven by a total of 675 h.p., and have an installed capacity of 6½ million B.t.u. per hour. It is installed at the margarine plant of the Co-operative Wholesale Society at Irlam, Manchester. The equipment manufactured by J. & E. Hall ranges from small refrigerated cabinets and compressors of ¼ h.p. to centrifugal compressors of the largest size in use today.

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MODERN REFRIGERATION

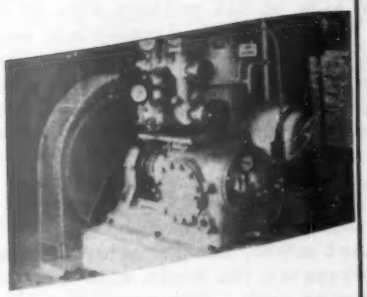
and Air Control News

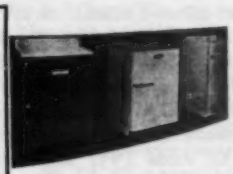
Incorporating
COLD STORAGE AND PRODUCE REVIEW
and ICE AND COLD STORAGE

Established 1898

Not at all in the tradition of our congress issues of 1908 (Paris), 1910 (Vienna), 1913 (Chicago), 1924 (London), 1928 (Rome), 1932 (Buenos Aires), 1936 (The Hague), 1951 (London), 1955 (Paris) is this number mainly devoted to this month's event in Copenhagen. Our presentation is plainly unusual, in view of printing conditions, but the content is perhaps not quite so wide of the mark.

As one who has attended all the above-mentioned occasions since 1924 (and believes that he is the only one in the world so to have done) the writer is of the opinion that we are entering upon a new phase of international congresses. The generation of gentlemen who inaugurated these events has now disappeared: wonderful as was their work in this field, there is now apparent a very strong desire to relate the work of the commissions more closely to everyday business and this aspect is likely to emerge in a pronounced manner later this month. Skål !!





MODERN REFRIGERATION *overseas*

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"M.R.", now in its 62nd year of publication, has built up for its overseas readers special subscription and sales agencies in all the above territories.

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THEODORE A. RAYMOND

Advertisement Manager:
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NEWS OF THE MONTH

DOMESTIC REFRIGERATION DEVELOPMENT COMMITTEE - The secretarial and administrative arrangements for the Domestic Refrigeration Development Committee will in future be undertaken by C.S. Services Ltd., 5 Carlos Place, London, W.1. This committee, usually known as DoRDec, comprises the eight leading manufacturers of domestic refrigerators and was formed in order to develop sales of domestic refrigerators in the home market. It will retain its independence of trade associations but will continue to work closely with them. Since DoRDeC came into being in 1956, purchase tax on domestic refrigerators has been reduced from 60 per cent to 25 per cent and hire purchase restrictions have been removed. The current sales of domestic refrigerators continue to increase and are running at a rate more than double that of 1956. The members of DoRDeC are:- A.E.I.-Hotpoint Ltd; Astral Equipment Ltd; Electrolux Ltd; English Electric Co. Ltd; Frigidaire Division of General Motors Ltd; General Electric Co. Ltd; Kelvinator Ltd; Pressed Steel Co. Ltd.

x x x

INSULATION FOR NEW OIL REFINERY.- Onazote has been used as the insulating material for plant at one of the largest new oil refineries in this country - the Esso Refinery at Fawley. The plant insulated consists of cold vessels, storage tanks and heat exchangers, in conjunction with butadiene extractor units, and several miles of inter-communicating pipes. There is a temperature range from -200°F. to +100°F. This installation of Onazote emphasizes the increasing use of this permanently efficient material for insulation where temperatures are very critical. To meet the different requirements of the various plant, Onazote of 1-in. thickness to 6-in. thickness was used. Onazote has a completely non-communicating cell-structure. Its high thermal efficiency and resistance to penetration by moisture vapour were important factors in its selection for this installation.

x x x

POLYETHYLENE PRODUCTION AT FAWLEY.- Monsanto's polyethylene plant at its new factory at Fawley, near Southampton, is now in production. Using a high pressure process it is making a range of polyethylenes at an initial rate of approximately 10,000 tons a year. Production facilities are already being expanded. The factory, the only one of its kind in Southern England, has cost some three and a quarter million pounds. It stands on an 111 acre site on the western side of Southampton Water, of which 15 acres have so far been developed. The factory is immediately adjacent to the Esso Petroleum Company refinery, from which it takes its raw material, ethylene. The ethylene is made in Esso's recently commissioned petrochemicals plant. Construction of the factory was started in June 1957 and commissioning began early in 1959. In addition to the manufacturing buildings there is a versatile 1/200th scale pilot plant reactor system capable of accurately simulating full-scale working conditions.

x x x

NEW FREEZER SHOWN - At King's College Hospital, London, last month, Smethurst's, processors of Regent frozen foods, showed an industry film and their representatives dealt with the subject of product presentation, with particular reference to the catering pack. The event was also the occasion for the first public appearance of Frigidaire's new upright frozen food storage cabinet.

x x x

NEW QUICK-FREEZING FACTORY.- Crosse and Blackwell have commenced building a new quick-freezing factory at Peterhead, Aberdeenshire, including a low temperature store of 250-ton capacity operating at minus 20 degrees F. This enterprise is limited in scope and is intended primarily to improve their own herring canning operations, but it is expected also to provide some quick-freezing facilities outside their own domestic needs which will be available for production of frozen packs for sale in the appropriate markets.

x x x

AIR-CONDITIONED MARINE DRILLER - Built at Southampton and later towed to the South China Sea, the "Orient Explorer" drilling platform has living accommodation for 36 men; this area has been air-conditioned by Frigidaire.

A.S.H.R.A.E. Appointments - Arthur J. Hess, president of the American Society of Heating Refrigerating and Air-Conditioning Engineers, 62 Worth Street, New York, N.Y., has announced the appointment by the board of directors of Robert C. Cross as executive secretary of the Society, effective July 1. Mr Cross will succeed Aubry V. Hutchinson, who becomes executive secretary emeritus. "Since the merger of its predecessor societies ASHAE and ASRE last January", said Mr. Hess, "we have felt the need for a single administrative head to govern all staff activities at New York headquarters. Mr. Cross, as former executive secretary of the American Society of Refrigerating Engineers, brings to the combined organization an impressive record of professional achievement and experience in industry, as well as society affairs.

x x x

NORTHERN REFRIGERATION EXHIBITION - There will be staged at The National Trade Fair Centre, Harrogate, from October 24 to 31, 1959, the first Northern Heating, Ventilating, Insulation and Refrigeration Exhibition. The exhibition has been expressly arranged for inclusion of all products and services directly relating, or ancillary to, the title headings and will cater for the industrial, commercial and domestic fields.

x x x

EDA OFFICERS FOR 1959/60 - At the annual general meeting of the Electrical Development Association Sir Josiah Eccles, C.B.E., M.M., D.Sc.,M. Inst.C.E., M.I.Mech.E., M.I.E.E., deputy chairman of the Electricity Council, was appointed president of the Association for the year 1959/60. Messrs. A.W. Ferguson, M.C.,C.A., former chief administrative offiver, Electricity Board for Northern Ireland, and John Mould, O.B.E., A.M.I.E.E., former chairman, East Midlands Electricity Board, were appointed vice-presidents for the term 1959-1962. At the first meeting of the Association's newly constituted council, Mr. T.E. Daniel, M.Eng., M.I.E.E., A.M.I.Mech.E., chairman of the North Western Electricity Board, was elected chairman for the year 1959/60, and Mr. D. B. Irving, B.Sc.(Eng.), M.I.E.E., chairman of the London Electricity Board, was elected vice-chairman.

x x x

PERSONALIA

The Prescold division of Pressed Steel Company Limited announces two important appointments in their United Kingdom sales organization. With effect from July 1, Mr M.S.Ware is appointed marketing manager - commercial refrigeration products, for the United Kingdom, and Mr. M. Horris is appointed marketing manager - domestic refrigeration products, for the United Kingdom. Mr.Ware was previously commercial sales manager and Mr. Horris was domestic sales manager. In their new positions they will have responsibility for the extention of sales and the marketing of refrigerators and refrigeration equipment within their respective spheres. Mr.Ware, who holds the degree of B.Sc.Eng.(Hons) entered the refrigeration industry as a pupil-engineer in pre-war years and after considerable experience in engineering entered sales management. He is an associate member of the Institution of Mechanical Engineers and a member of the Incorporated Sales Managers Association. Mr Horris is a member of Pressed Steel Company's Twenty-Five Year Club and has in fact served a total of twenty-nine years with the company. The early part of his career included considerable experience in service work which is an extremely valuable background for his new appointment. He is a Member of the Incorporated Sales Managers Association.

x x x

Mr. R.J. Hearne, A.M.I.E.E., M.Inst.R., has been appointed a director of L. Sterne & Company (Ireland) Ltd. Mr. Hearne joined the company as general manager ten years ago, and has a considerable background of experience in the refrigeration industry. Sterne's Irish company is a very successful undertaking, and numbers among its customers many of the largest users of refrigeration in that country. In addition to their head office in Dublin, L. Sterne & Co. (Ireland) Ltd., has a network of depots and agents throughout the country - noted for high quality of work, service etc. They also design and undertake directly, the insulation of cold chambers of every description - from very low temperatures to refrigerated gas stores for fruit etc.

x x x

Mr.F.McPherson and Mr. J.K.W. MacVicar have been appointed joint managing directors of Thermotank Ltd., Glasgow, in view of Mr.I.M.Stewart's appointment as chairman of Hall-Thermotank. Ltd.

ICE
ICE

JD INSULATING

Ronald H. Jeffery, A.E.I.-Hotpoint Ltd. northern division sales manager since July 1957, has been appointed southern division sales manager from July 1. Mr. Jeffery joined Hotpoint as administrative sales manager from Beecham Foods in November 1956. James Mackie Donald has been appointed A.E.I.-Hotpoint Ltd. northern division sales manager from July 1. Joining Hotpoint from Quality Foods Ltd., where he was general manager and director, he succeeds R. H. Jeffery.

x x x

The Prestcold division of Pressed Steel Company Limited announces the appointment of Mr.Peter Taylor as sales promotion and advertising manager, in succession to Mr. John Lampson who has resigned from the company. Mr. Taylor, who for two years prior to his new appointment was advertising executive for the Prestcold division, has had varied experience in the Publicity field. In the immediate post-war years his chief activities were concerned with the launching of new products with advertising agencies in London and then, as he was interested in the wider aspects of marketing in addition to purely specialized advertising techniques, he joined Biro Swan Limited and later became publicity controller.

x x x

Mr. L. P. Dack, the managing director of United Air Coil Ltd., left London Airport recently on a four weeks' business trip to Canada and the United States. While he was there he investigated Canadian markets and was invited to visit a number of U.S. manufacturers connected with the heating and refrigeration industries.

x x x

Another refrigerated cargo liner for the Shaw Savill Line was launched on July 20th at the Naval Yard, Walker-on-Tyne, of Vickers-Armstrongs. She was named "ILLYRIC" and the launching ceremony was performed by Lady Hermione Cobbold, wife of Mr. C.F.Cobbold, governor of the Bank of England. The "ILLYRIC", the 21st vessel built for the Line since World War II, is the first Shaw Savill ship to bear this name. The Shaw Savill has an impressive record of new building since 1945, the "ILLYRIC" bringing the total to over a quarter of a million tons. This is the second post-war Shaw Savill vessel to be built at Newcastle-on-Tyne by Vickers-Armstrongs, the first being the "CANOPIC" which was delivered in December 1954. "ILLYRIC" is a single-screw motor vessel of approximately 11,000 gross tons and her general design is similar to the single-screw vessel "IONIC" which came into service on March 6 this year. She has a service speed of 17 knots and in her six cargo holds, four of which are insulated, she has capacities of about 425,000 cubic feet for refrigerated and chilled cargo and about 245,000 cubit feet for general cargo. "ILLYRIC" should make her maiden voyage from this country in January 1960. In addition to "ILLYRIC", two more refrigerated cargo liners of the same class are at present on order for the Shaw Savill Line, both of which are scheduled for delivery towards the end of next year.

X X X

ILLUSTRATIONS OPPOSITE (p.668) - 3. Mr.M.S. Ware, Prestcold, now marketing manager, commercial refrigeration products; 1. Mr. M. Horris, marketing manager, domestic refrigeration, Prestcold; 2. Mr. Peter Taylor, sales promotion and advertising manager, Prestcold; 4. Mr. R.J. Hearne, director, L. Sterne & Co. (Ireland)Ltd. These appointments are dealt with on pages 667 and 669. 5. United Carlo Gatti's latest vehicle for ice delivery; 6. a vintage model, formerly owned by the same firm (see page 689); 8. and 7. The new factory of "J.D." Insulating Co. Ltd. opened last month at Totton, Southampton, by Miss M. Lomax (fourth from left) joint managing director, and her co-director (extreme left) (see page 691); 9. m.t. Sir William Hardy mentioned in the Torry Research Station's review of progress (see page xlv, supplement); the photographer photographed (illustration 10)-On the occasion of the annual meeting of The Scottish Association of Cold Storage and Ice Trades, "M.R."'s representative was himself shot by the "Aberdeen Press" photographer - Mr. Robert Finlay; extreme left, himself an editor, of the Association's bulletin, appreciates the situation.

ILLUSTRATIONS ON PAGE 670 - The photographs overleaf show the hermetic unit division's, L. Sterne & Co. Ltd., factory at Hillington, Glasgow, and its managing director, Mr. David S. Carruthers. The plant, which manufactures units under licence from Tecumseh Products Company, U.S.A., now produces over 1,800 units a day and is still undergoing considerable expansion - called the "B" and "M" plans which will be described next month.

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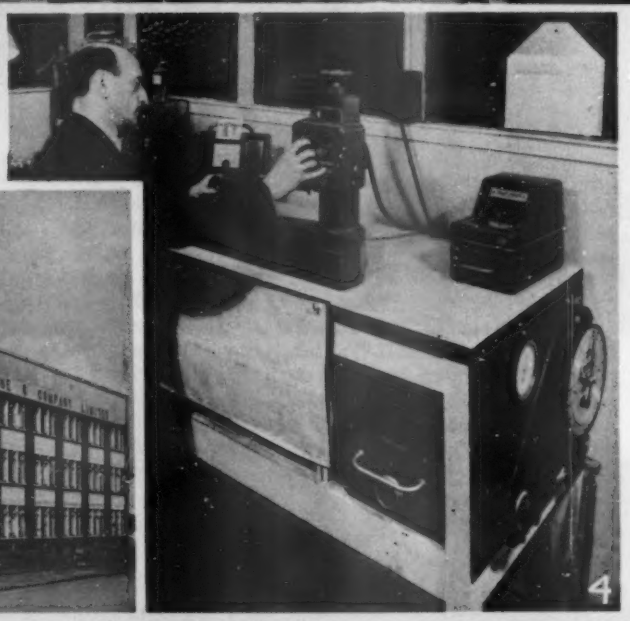

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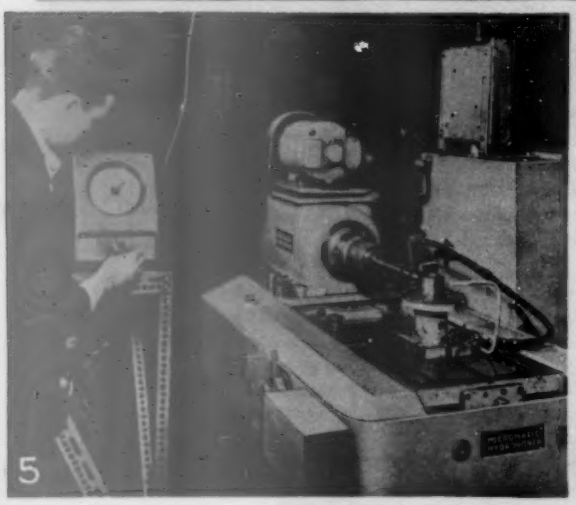

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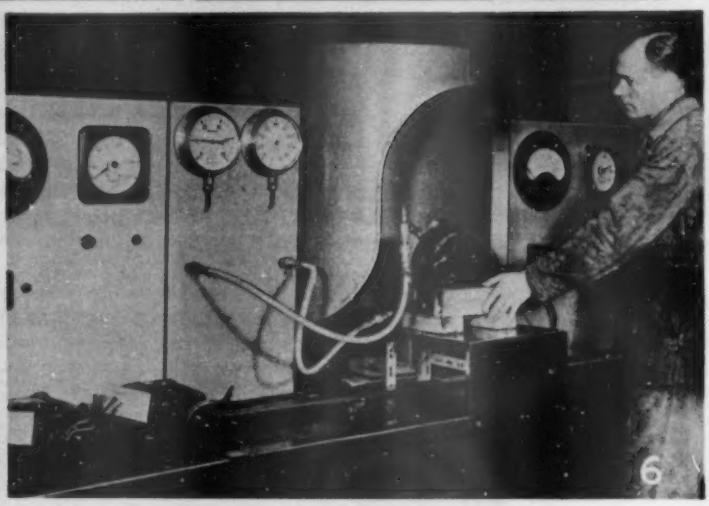

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NEW RANGE OF SMALL NITROGEN PLANTS

A range of small, compact and completely self-contained plants for the supply of liquid or gaseous nitrogen, has been developed by Refinery Equipment & Speciality Co. Ltd., Valley Works, Monton Road, Eccles, Lancs., to the design of H.E.Charlton Engineers Ltd. Five models are available which between them cover capacities from 1.5 to 24 litres of liquid nitrogen per hour or 2 to 30 standard cubic meters (70 to 1000 s.cu. ft.) of gaseous nitrogen per hour.

These plants are designed to produce nitrogen of up to 99.9 per cent. purity by the liquefaction and fractional distillation of air. By virtue of their sizes, weights and capacities they are ideal for use in tropical and isolated areas where supplies of nitrogen are not readily available from other sources. Applications include the provision of liquid nitrogen for petroleum gas analysis on remote oil field sites and liquid or gaseous nitrogen for general laboratory, refinery and chemical works useage.

All R.E.S.Co. nitrogen plants comprise four principal sections which carry out the following functions:-

1 - compression of the incoming air
2 - removal of carbon dioxide
3 - drying
4 - condensing and subsequent separation of nitrogen by fractional distillation.

The use of regenerative driers, a caustic soda scrubber, and cross counter current heat exchangers, ensure long trouble-free runs. The drying and separation sections are each housed in neat, attractive, stove-enamelled cabinets. Foundations are required for the high pressure multistage compressor and caustic soda scrubbing tower but these units can be housed in positions remote from the other two.

The plants are fully instrumented, completely wired up electrically and only require interconnecting pipework and electricity supply cables to be installed by the user.

x x x x x

NEW SHRINKABLE WRAPPING

A new shrinkable Pliofilm will be exhibited for the first time by the Goodyear Tyre & Rubber Co.(Gt.Britain) Ltd., at the Packaging Exhibition on Stand No. 19 in the National Hall on the first floor at Olympia from September 8 - 18. Marketed by E.S. & A.Robinson under their trade name "Shrinkwrap", the process will be demonstrated to all interested enquirers. The most interesting variation of the Goodyear film, oriented or shrink Pliofilm is a strong packing film, readily applied by hand or machine. It consists of molecules of the original film aligned in a definite direction by the orientation process. The really tight wrap makes the chicken so appetizing in appearance; the strength of the material enables it to withstand transport and handling stresses, the rigours of freezing and storage at low temperatures and ensures the hygienic exclusion of contamination.

x x x x x

OBITUARY
M. Leon Fontanel

His many English friends will be sorry to hear of the passing of M. Leon Fontanel at Lyons in his 80th year. He has been buried at Cave, near Perpignan, where he was born.

The late M. Fontanel was one of the kindest of men. He was one of the pioneers of refrigeration in France, having started the Entrepots Frigorifiques Lyonnais on his return from Canada, where he went as a youth to find work. He built this up into one of the largest groups in Europe, and certainly one of the most go-ahead in research and development. His knowledge of recent publications was encyclopaedic, as was his acquaintance with English scientific classics; he not only knew what Bacon or Darwin had said, but could show you the passages in his library.

One recalls his excellent plenary session paper at the last International Congress, and also the active mind in the frail body, when we last saw him at the meeting of commission V in Lyon in 1957.

x x x x x

A method developed by Stillite is intended to provide a reliable and efficient method of insulating steam, hot and cold pipes in the ground - dry or waterlogged. The scheme is inexpensive and extremely economical of labour since the depth and width of the excavation are much smaller than required for conventional methods. The method is described in leaflets Nos. 7 and 16/59.

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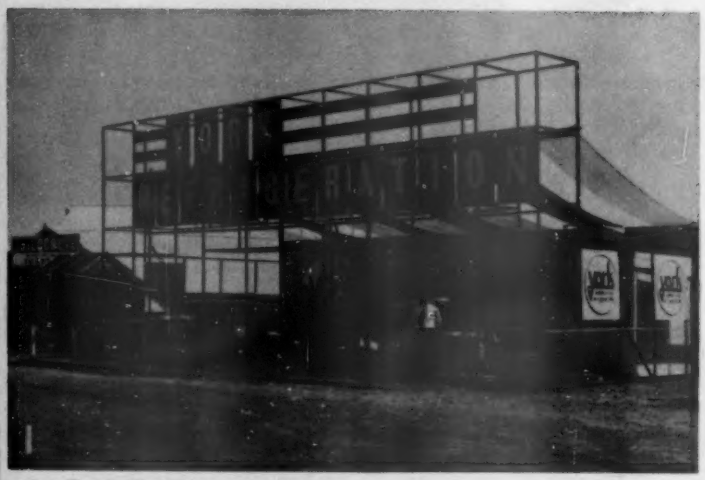
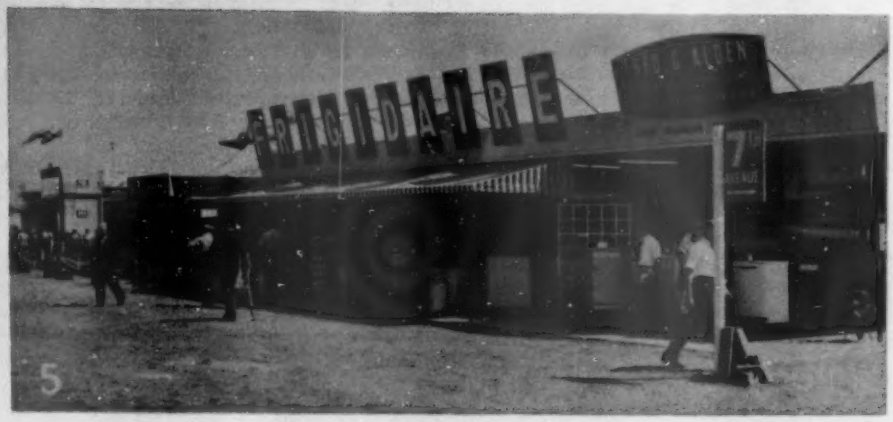


1. York Shipley Limited

2. Mr. E.W. Harrison, York, demonstrates a milk cooler

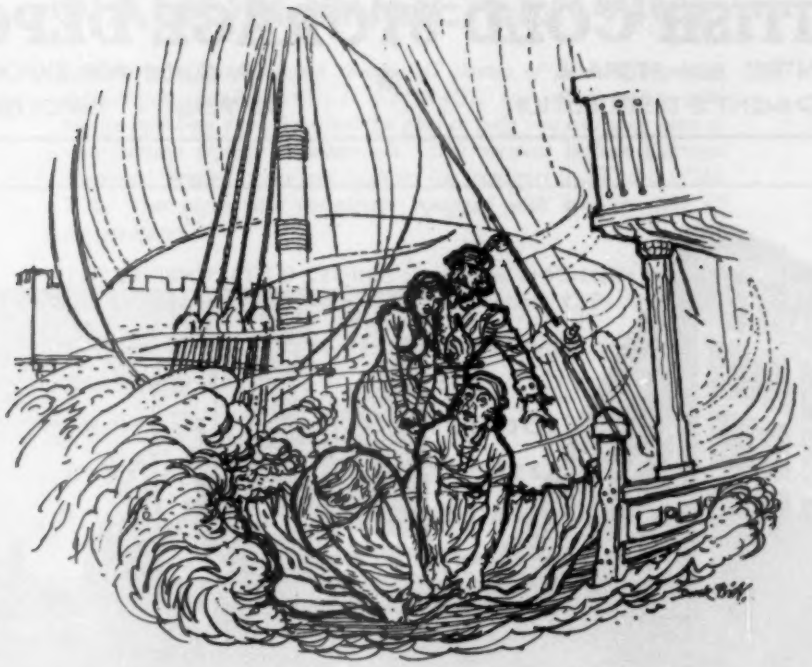
3. The Prestcold stand

4. On J.& E. Hall's stand - Mr. A.W. Baines & Mr. G.D. Munday (centre) & the new ice-maker



5. The Frigidaire Pavilion

REFRIGERATION FIRMS AT THE "ROYAL" AT OXFORD LAST MONTH



'Go fetch a web o' the silken claith,
Another o' the twine,
And wap them into our ship's side,
And let nae the sea come in.' BALLAD OF SIR PATRICK SPENS

Alas, the sea did come in, as you may remember, and the ship was lost with all hands.

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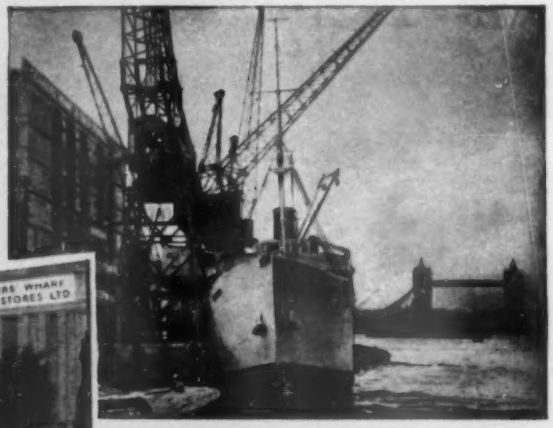

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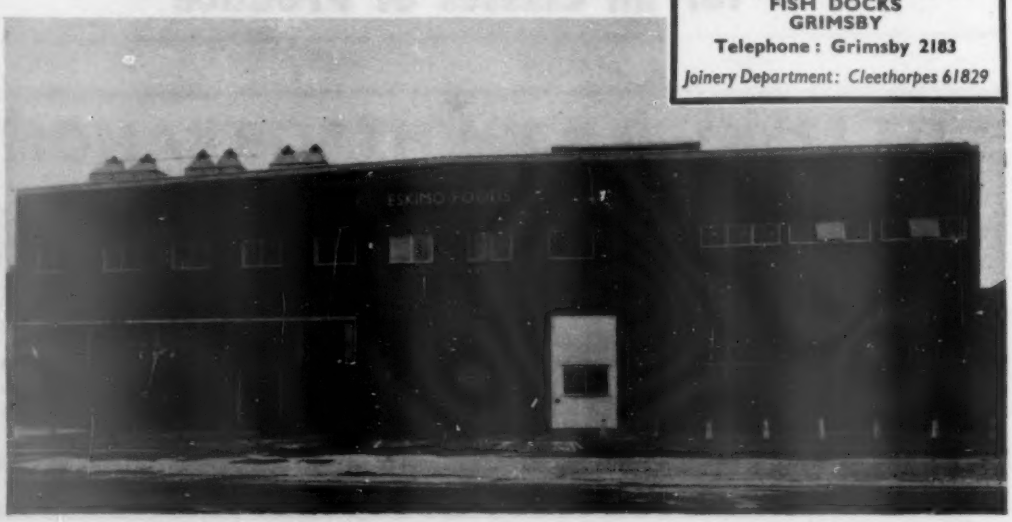

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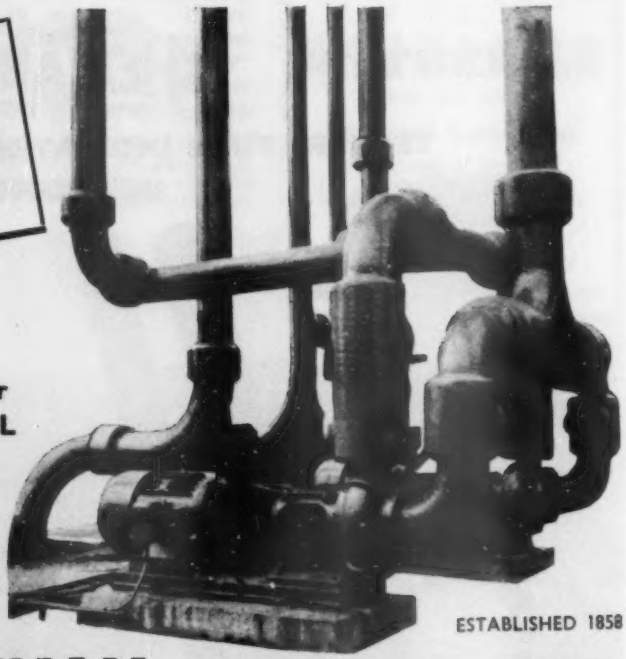

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COPENHAGEN

AUGUST 18-26

Special
Congress
Supplement

Except for the opening ceremony, all congress meetings will take place at the Danmarks Tekniske Hojskole - the Royal Technical University of Denmark at OSTER VOLDGADE 10, Copenhagen, where registrations will also be effected. The university is located in the northern part of central Copenhagen, the nearest station on the suburban electric train being Osterport (6 minutes from central station Kobenhavn H, and from here it is a 10-minute walk to the congress meeting-place. The nearest tram stops are Osterport (lines 1,6 and 9) and the corner of Solvgade/Oster Voldgade (tram line 10, bus lines 38 and 40 and trolley bus lines 23, 24.)

During the congress, a projection room will be set aside for the showing of films relating to the production of cold and the many applications of refrigeration. The papers committee has endeavoured to assemble a collection of films for these showings but the invitation to delegates to bring such films is still open. The films, however, must have technical interest for the congress for the committee will not undertake the projection of reels made for purely publicity purposes.

It is hoped to stage an exhibition of scale models of modern refrigerated ships, railway cars and trucks which will break new ground for the congress.

The display of teaching aids, such as manually or electrically operated models of machinery or parts thereof, models of plants or processing lines, demonstration apparatus used in teaching refrigeration principles, will also be mounted.

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Anyone who has been connected with the organization of an international refrigeration congress will know what tremendous effort has to be put into the staging of such an event. It is our pleasure, therefore, to reproduce below the portraits of three leading personalities closely concerned with the preparations over the past year and we offer them congratulations for the work already put in and trust that their labours, and those of their committees, will be crowned with success in the Danish capital.

Mr. S. Mansted,
president, organizing committee

Mr. M. Jul,
president, papers committee

Mr.K. Meyer,
president, finance committee

OUTLINE OF PROGRAMME.

On Tuesday, August 18, eve-of-congress day, visitors will be arriving in Copenhagen from all parts of the world. The technical board will meet at 2pm on that day while registration for all delegates will proceed from 3pm to 8pm. The following is an outline of the main events arranged for congress week:-

	A	B	C
WEDNESDAY, 19th	8am - 10am Registration continues 10am - noon Opening meeting at Copenhagen town hall 2pm - 5.30pm Meetings of Commissions	6.30 - 8pm Reception given by City of Copenhagen in town hall (invitations to follow)	Guided, afternoon tour of the city by coach, covering all main points of interest.
THURSDAY, 20th	7.30am - 9am Technical visits 9am - noon 1st plenary meeting 2pm - 5.30pm Meetings of Commissions	6.30pm - 8pm Reception given by Danish Government at Christiansborg Castle (invitations to follow) 9pm Informal soiree at Falkonercentret	Full-day trip - I 9.45am Leave for Louisiana (art museum), Fredensborg Castle and open air museum of old farmhouses
FRIDAY, 21st	9am - noon 2nd plenary meeting 2pm - 6pm Technical visits 8pm - Causerie: "Fifty years of low temperature research and development since Onnes's first liquefaction of helium" by Prof. Dr. F.G. Brickwedde, Pennsylvania, U.S.A.		10am - Tour of arts and crafts - Georg Jensen (silver) Bing & Grondahl (china) and Den Permanente (sales exhibn for arts and crafts) Lunch at restaurant Nimb, Tivoli, 12.30pm
SATURDAY, 22nd	9am - noon Meetings of Commissions 3pm General Conference - x		
SUNDAY, 23rd			10am - 5pm - Full day trip in North Zeeland

A - technical arrangements; B - non-technical arrangements; C - Associates' programme
x - closed meeting

	A	B	C
MONDAY, 24th	9am- 3rd plenary meeting 2pm-5.30pm - Meetings of Commissions	9pm - Concert given (or, rather, offered) by Danish Government in Tivoli Music Hall	9.45am - Full day trip II Denmark Aquarium, etc.
TUESDAY, 25th	8am - Technical meetings 9am - Executive committee 2pm - 5.30pm - Meetings of commissions	8pm - Congress Banquet in well-known Wivex Restaurant, Tivoli	
WEDNESDAY, 26th	9am - noon - Meetings of Commissions Noon - Closing ceremony		

Copenhagen Town Hall, venue of an official reception.
Inset: Christiansborg Castle (Houses of Parliament) wherein members will be received by the Danish Government.

COMMISSION II - (continued from July)

Heat transfer in heat exchangers.

Natural convection in the air with little temperature differences. K.Brodowicz. Centralny Zavzad Przemysln Chlodniezego, Warszawa (Poland). The experimental work was carried out by the author to check the results of computation of heat transfer by the formulae taken from literature. The curves were determined by test and calculation from formulae. The conclusion is that both are very close to each other. The A. has adopted Mach-Zehnders interferometer to measure the distribution of temperature near the surfaces.

The determination of the efficiency of quadratic plate fins by means of an electrical analogy model. F. Schubert. Technische Universitat, Berlin. (Germany.) The temperature distribution in quadratic or rectangular plate fins which are fitted on to a tube has not yet been determined analytically, as it presents a two dimensional heat conductivity problem with complicated boundary conditions. For the solution of this problem an electrical analogy model used by Bruckmayer and recently improved by Komossa has been adapted.

Heat transfer in frosted pipes. G.Trapanese. Instituto di Fisica Tecnica, Universita di Padova. (Italy). The process of heat transfer in an evaporator pipe during frosting is studied in relation to air speed and relative humidity.

The reason for the invalidity of the Lewis ratio in the case of air washers. A. A. Gogolin. Scientific Research Institute of the Refrigerating Industry of the U.S.S.R., Moscow (U.S.S.R.). Experiments carried out by the author on various types of air washers (both stream and spray types) show that the higher value of the Lewis ratio is due to the higher than theoretical value of the moisture content of the outflowing air.

Investigation of a wet-air cooler. H. Brauer. Max-Planck-Institutiner Stroemungsforschung, Goettingen. (Germany). Experiments have been carried out in order to obtain performance data of a wet-air cooler under variable operating conditions. The results prove the existence of three different flow regimes, which coincide for all measured quantities.

Characteristic equation of the counterflow cooling tower. H. Uchida. Faculty of Engineering University of Tokyo (Japan). The A. proposed the following approximate formula to represent the relation between enthalpy and temperature of air saturated with water vapour agreeing with the real valued within 1% for temperatures between 20 and 40 C: $i = 8.265, -0.241\ t + 0.0254\ t$.

Instrumentation; thermodynamics and various problems.

The use of semi-conductor thermistors for measuring low temperatures. I. A. Pavlova. Scientific Research Institute of the Refrigerating Industry of the U.S.S.R., Moscow. (U.S.S.R.). Semi-conductor resistance thermometers (thermistors) are claimed to have a number of essential advantages as compared with wire resistance thermometers; small dimensions, high sensitivity, low inertia.

Dimensionless groups in thermodynamics. R. Plank. Kaltetechnisches Institut der Technischen Hochschule, Karlsruhe. (Germany). As the law of corresponding states, according to Kamerlingh Onnes, can be derived from the principle of mechanical similarity of the molecules, it is advisable to introduce some dimensionless numbers of groups of properties, in analogy to methods used in fluid mechanics and in heat transfer. Such thermolynamic numbers should also be given the names of prominent scientists and they should be expressed by the first two letters (italics) of those names.

Similarity criteria for the determination of P-v-T parameters of refrigerants.I.S.Badylkes. Scientific Research Institute of the Refrigerating Industry of the U.S.S.R., Moscow.(U.S.S.R.). The possibility of determining the P-v-T parameters of non-studied substances by means of only two basic experimental points on the saturation line, namely, the normal and critical temperatures.

The determination of work of compression with new and little studied refrigerants. B.S.Weinberg. Moscow Bauman Higher Technical School Moscow. (U.S.S.R.) For the determination of work, consumed in a compressor at adiabatic and isothermal compression thermal diagrams, tables of superheated vapour, or respective equations are required. No such data being available on new and little studied refrigerants, it is necessary to find new ways.

Electrical networks for simulation of refrigerating apparatuses and plants. U.Wesser and E.Blass. Lehrstuhl fur Allgemeine und Kern-Verfahrenstechnik der Technischen Universitat, Berlin (Germany). It is well-known that the steady-state operating behaviour of refrigerating plants and apparatuses can be studied analogically by means of electrical resistance systems as long as there occurs thermal and hydrodynamical processes. Because of the exceptionally small inertia of electrical systems, it is possible to solve in no time problems dealing with automatic control, optimization, etc., under the variation of existing parameters for a complicated plant. Calculation and construction of electrical-analogy networks are explained briefly for steady-state thermal processes. The amount of possible error is discussed.

Investigation of the controlling effect of surface variables on the rate of cooling of a solid body. C.F.Kayan. Department of Mechanical Engineering, Columbia University, New York. (U.S.A.) In this study and for very important reasons of practice, attention is focused on the characteristics of transient-body resistance, and specifically on the ratio of the surface-resistance to the total.

Transient effect of structure and goods on space-temperature and heat-exchanger performance of a refrigerated complex via electric-simulation technique. C.F.Kayan. Columbia University, New York. (U.S.A.) In cold storage warehouse operations, of particular interest is the influence on the transient space-temperature-time history of a "hot-goods" load suddenly introduced into the refrigerated zone of an insulated and cooled structure. In the present paper experimental simulation methods are employed entirely, using pilot process-prototype transient resistance-capacitance elements.

COMMISSION III - DESIGN, CONSTRUCTION AND OPERATION OF MACHINERY AND AIR CONDITIONING PLANTS.

Indicating of hermetically sealed compressors. V. Puner, E.Schoberl and R. Tauchmann. Staatstechnikum, Karlsruhe and K.Bach, Stempel-Hermetik GmbH, Frankfurt a/M. (Germany). Progress in electronic measuring methods has made it possible to develop a device which is suitable for taking indicator charts of compressors with the smallest swept cylinder volume.

Rating and testing sealed refrigeration compressors. H.L.von Cube. Wilhelmsfeld bei Heidelberg. (Germany). The rating and range of application of hermetically sealed compressors are influenced by the way the motor is installed (cooled by the vapours drawn in, by the compressed vapours and/or by the heat transfer through the casing). The range of application is limited by the inherent characteristics of the oil, the refrigerant and the insulating material of the motor.

Two instruments for the study of motor conditions in hermetically sealed compressors.A.C.Murdoch and C.J.Hurrell. Pressed Steel Company Ltd., Oxford (United Kingdom). The first instrument provides an accurate means of measuring compressor speed by the counting of pressure pulses in the discharge line which are displayed on a counter and integrated within the time setting of an accurate electronic gate. The second instrument provides stable measurement for use with the basic circuits for measuring resistance of a-c energized windings, described by R.E.Seely to A.I.E.E. in November 1954.

Methods of testing and selection of non-cellulosic insulating materials to be used in hermetically sealed refrigerating machinery. I. Sauerbrunn. Ladenburg/Neckar (Germany). The development of sealed high-speed refrigerating machines, the increased use of Freon 22, the desire to cut down drying periods and to make better use of the motor outputs have opened the way for the replacement of cellulosic insulating materials by materials which are more temperature resistant.

Improvements in hermetic or semi-hermetic rotary compressors. U. Sellerio. Istituto Superiore di Sanita, Rome (Italy). This is a new process for coupling the electric engine and the rotary compressor, resulting in striking savings on construction costs and in space required.

On the performances of the electrodynamical oscillating compressors.J.Nagaoka. Tokyo University of Fisheries, Tokyo (Japan). In these experiments the characteristics of electrodynamical, oscillating compressors made in Japan under licence from Heinrich Dolz (German) have been investigated.

The influence of charge, internal volume and restrictor upon starting and running conditions of hermetically sealed compressors systems. A.F.Enemark and K. Roelsgaard. Danfoss, Nordborg. (Denmark). A refrigerator operating at maximum ambient temperature must be able to operate satisfactorily at a voltage 20% below normal It is possible to obtain the desired operating characteristics with a relatively small motor and a moderate starting torque when certain conditions are observed.

Water equilibria in hermetic units. H. Steinle. Refrigeration laboratory of Robert Bosch GmbH, Stuttgart (Germany). Synthetic zeolites are the most effective drying agents with 20% by weight absorbed water at 20°C when in contact with F12 with 10 ppm water content. At 60 C, too, synthetic zeolites with 15% water absorption are superior to all other driers picking up only 3% or less. Whether this high capacity can be utilized in a refrigerating cycled is not quite certain. Insulating paper is able to absorb up to 6% of the water at 20 C and about 2% of the water in F12 with 10 ppm water content.

Lubrication of journal bearings with refrigerant-oil solutions. A. Thelen. Kaltetechnisches, Institut der Technischen Hochschule, Karlsruhe (Germany). In sealed compressor, part of the refrigerant condenses into the oil of the compressor and so changes the physical properties of the lubricant. The viscosity is reduced and the vapour pressure increased. The influence of these two changes on the lubrication is investigated.

Absorption of refrigerant vapour in absorption refrigerating systems. M. Patrman. Research Institute of Refrigerating and Food Industry Machinery, Praha (Czechoslovakia). The report gives

a theoretical analysis and an experimental study of the process of absorption of refrigerant vapour in absorption refrigerating systems.

Study of a refrigerating machine of Platen-Munters type. S.Gajczak. Institute for Thermal Technique of the High Polytechnic School of Warszawa (Poland). The study of thermodynamic cycle in diffusion refrigerating machine made by means of the enthalpy-concentration diagram of a NH_3 H_2O solution and of NH H gas-vapour mixtures shows that the low output of these machines is due theoretically to incomplete rectification and to the unsuitable rate of circulation of the gas-vapour mixture.

The vortex refrigerating unit. A.P.Merkulov. Kuibyshev Aviation Institute, Kuibyshev (U.S.S.R.). The possibility of obtaining a considerable refrigerating effect, over a large range of expansion, and the exceptional simplicity and reliability in the construction of the vortex cooler encourage the search for a means of utilizing it practically in refrigerating units.

Testing of a large Ranque tube in Rumania. P. Ioanid. Energetics Institute of the Academy of Rumania. The scientific and experimental investigations on the Ranque tube have extended over the last years.

Estimating thermoelectric cooling. A.F.Ioffe. Institute of Semi-conductors of the Academy of Sciences of the U.S.S.R., Leningrad (U.S.S.R.). It has been known for over 100 years that, depending on the direction of the current, a boundary between two different conductors may be cooled or heated. However, as long as metals were used, the drop of the temperature did not exceed 6°C. semiconductors already raise the limit to 70 C. and will probably go still farther.

Investigation into the effect of the mobility of free carriers on the efficiency of Peltier junction. L. Stourac. Institute of Applied Physics, Academy of Sciences of Czecoslovakia, Praha. In the paper, the variation of efficiency of direct conversion of electric power in Peltier junctions with the concentration and the mobility of free-charge-carriers is discussed.

The Peltier effect contra the conventional refrigerating process. M. Backstrom, Stockholm. (Sweden). The paper deals with the Carnot-efficiencies of the present refrigerating processes, i.e. the rate of the real c.o.p. and the c.o.p. of the Carnot process.

Engineering possibilities of thermoelectric refrigeration. A. Siemens (Germany). Development has now advanced to a stage where engineering applications appear promising. The advantage of the new refrigeration process consists in the possibility of generating cold in close proximity to the places where it is needed and with minimum space required for the refrigerating elements. Numerous technological problems are still awaiting their solution before this goal will be finally attained.

The energy characteristics of electro-thermal cooling. V.S.Martinovsky and V.A.Nayer. Odessa Technological Institute of the Food and Refrigerating Industry, Odessa (U.S.S.R.). The correlation of the coefficient of performance (c.o.p.) of compression and absorption refrigerating machines to their capacity and the temperatures of the heat sources is analysed based on experimental and design data. A precise method is suggested for calculating electrothermal refrigerating systems.

Experimental study of flow in the prerotary grid of a refrigerating turbo-compressor. J.Prouhet. Ets. Brissonneau et Lotz, Nantes (France). The present study aims to study the characteristics of a turbo-compressor prerotary grid by means of a blowing test similar to a test on the grid of an axial-flow compressor.

Simulation tests of refrigeration turbo-compressors. F. Wergner. VSCHP. Praha (Czechoslovakia). This paper gives test methods for turbocompressor prototype in a substitute circuit.

Investigation of high-speed compressor discharge valves. B.L.Tsyrlin, Scientific Research Institute of the Refrigerating Industry of the U.S.S.R., Moscow (U.S.S.R.). Experimental investigation has been made at the VNIKhl (the Scientific Research Institute of the Refrigerating Industry of the USSR) on an 80 mm stroke and bore ammonia compressor at 906 and 1450 r.p.m. The main purpose of the cited experiments was investigation of heat exchange processes in the compressor.

A new device for the compressor valve S.Hotani and J. Nagaoka. Tokyo University of Fisheries, Tokyo (Japan). Developing volumetric efficiency and valve durability has been a very important problem for the refrigerating compressor. Better discharge characteristics cannot be expected from the present valve design.

Measurement of the dynamic performance of automatic compressor valves. C. Lorentzen and O.Johansen. Norges Tekniske Hogskole, Trondheim (Norway). The paper describes a technique used at the Technical University of Norway, allowing simultaneous indication of valve movement and pressure drop. The method allows calibration in place at working temperature for all important readings.

Study of pressure drops in piston compressor valves and their effect on rating. P.Girardin. Ets Brissonneau et Lotz, Nantes (France). The accurate determination of pressure drop in valves is therefore indispensable for the design of piston refrigerating compressors to run at high speed. The present report develops a method of graphical calculation of these drops according to operation.

Measurement of valve losses in reciprocating compressors. S.F.Pearson. Torry Research Station. Aberdeen (Scotland). The various losses affecting the performance of reciprocating compressors are detailed.

"M.R." August 1959

The volumetric efficiency of refrigerating compressors. I. Bendixen. A/S Atlas, Copenhagen. (Denmark). Generally it is supposed - without, however, having proved experimentally to support this theory - that the counterflow compressor concerning volumetric efficiency is better than the uniflow compressor. The situation has been investigated.

The volumetric efficiencies of refrigerating compressors having various capacities. V.F.Chaikovsky. Odessa Technological Institute of the Food Refrigerating Industry, Odessa (U.S.S.R.). The volumetric efficiency of a refrigerating compressor depends on its design, the refrigerant used, the operating cycle and the capacity of the machine. Ample investigations carried out on various compressors made it possible to define certain regularities in the variation of the value of the volumetric efficiency and its constituents.

The total environmental effect on capacity and operation of open type reciprocating compressors in the 30° to 50°F suction range under refrigerant 12 operation at speeds of rotation in excess of 1500 r.p.m. F.D.Klein. Governair Corporation, Oklahoma City. (U.S.A.). This paper explains the necessity for properly selecting and 'fitting' a compressor to the requirements and covers other aspects of the subject.

Crankcase heating. P. Berliner. Lindau/Bodensee (Germany). It is shown that crankcase heating up to 50°C. is sufficient to prevent excessive absorption. Furthermore crankcase heating is indispensable where the ambient temperature of the compressor may be lower than the saturation temperature in the evaporator.

Separation of mineral lubricating oil from Freon 12 (dichlorodifluoromathane) in refrigerators. H. Heckmatt. Thornton Research Centre, Chester. (United Kingdom). While studying the performance of lubricating oils in compressor-driven refrigerators using Freon 12, the author observed that oil accumulated in the low pressure side of the expansion valve. This was unexpected since laboratory solubility studies had shown that Freon 12 and mineral oils were completely missible in all proportions over a wide temperature range.

The capillary tube in the operation of a refrigerating circuit. L. Mattarolo. Instituto di Fisica Techica University of Padua (Italy). In this paper, not only the flow of refrigerant in two phases from the point of view of thermodynamics is considered also the variations of the efficiency of the circuit when it operates off the point of equilibrium for the tube.

An investigation of a gas pump liquid recirculation system. G. Lorentzen and O.A.Baglo. Norges Tekniske Hogskole, Trondheim (Norway). Liquid recirculation systems have gained increased acceptance in large refrigeration plants during recent years. One of the systems considered uses high pressure refrigerant gas to supply the pumping effect in direct contact with the cold liquid. The resulting heat exchange leads to certain thermodynamic losses.

Effect of on-off control on working economy of refrigeration equipment. V.Polak. Research Institute for Refrigeration and Food Engineering, Praha (Czechoslovakia). Evidence is offered that economy of refrigerating cycle increases with the decrease of the length of the running cycle, and the effect of evaporator and condenser time constants is shown.

Diagrams of ammonia circulation in multi-circuit cold stores. G.Saint-Gibons. Compagnie des Entrepots et Gares Frigorifiques, Paris (France). The use of direct expansion in large split up multi-circuit cold stores, with automatic or semi-automatic operation, requires special arrangements for the circulation of ammonia, where the flooded feeding of evaporators from "general" liquid-separators cannot be applied without difficulties.

Investigation of the thermodynamic processes in the working cycle of the Philips gas refrigerating machine. L. Z. Melster and I. I. Karavansky. Odessa Technological Institute of the Food and Refrigerating Industry, Odessa (U.S.S.R.). The paper discusses the operating conditions of the Philips gas refrigerating machine with sinusoidal motion of the pistons. It is presupposed that all the processes in the machine are performed reversibly by means of two constant temperature heat sources.

Nuclear refrigeration. A. Kramish. The Rand Corporation. Washington (U.S.A.). One of the neglected applications of nuclear energy is the field of refrigeration. A "conventional" nuclear power plant can provide the electrical power necessary for a compressor cooling type system or the heat to operate an absorption system. However, if cooling is the prime requirement of a nuclear power plant there are other more interesting, direct and efficient means for coupling cooling devices to nuclear power.

A mechanico-electric apparatus for the measurement of refrigerating capacity. Chytracek and Petrmichl. Institute for Refrigerating and Food Industry Machinery Research, Praha (Czechoslovakia). A mechanico-electric apparatus was developed, which may be connected with an ammonia refrigerating system of 25,000 - 250,000 kcal/hr for evaporation temperatures of -5 , -35 C. and for temperatures of 0°, +25°C. before the regulation valve.

Economic comparison of water and air-cooled condensers. D.Pnueli and R. Landsberg. Israel Institute of Technology, Haifa (Israel). Parallel series of tests have been carried out on a laboratory refrigeration plant working alternatively with a water-cooled and an air-cooled condenser.

The use of standard air cooled condensing units in high ambient temperatures. H.Mervyn Meacock. Basrah (Iraq). Evaporative air coolers known as "desert coolers" have gained a good deal of popularity and are very cheaply manufactured. These coolers have been successfully applied even in high wetbulb temperatures as a means of producing condenser cooling air which will enable standard equipment to

be used satisfactorily. Survey of world temperatures indicates practically no places to which the system is not applicable.

COMMISSION IV - APPLICATION OF REFRIGERATION TO FOODSTUFFS AND AGRICULTURAL PRODUCE.

Prepacking at low oxygen partial pressures. R.Heiss. Institut fur Lebensmitteltechnologie und Verpeckung, Munich (Germany). In the field of prepacking empire methods still prevail. It, therefore appeared necessary to study the influence of temperature, vacuum, gas permeability of the packaging material, and exposure to light. The paper deals with these aspects.

Use of plastic packaging in addition to refrigeration in the storage of fresh fruit. P. Margellin, Station Experimentale du Froid, Laboratoire de Biologie, Bellevue (France). By means of suitable packaging, the respiratory activity of fruit can be more or less reduced without marked lowering of the storage temperature below the usual level.

Use of containers with plastic walls for the storage of William's pears. Cl.Leblond. Station Experimentale du Froid, Laboratoire de Biologie, Bellevue (France). The experience obtained in the storage of apples and pears in polyethylene bags shows that the composition of gas atmospheres naturally formed around the fruit is extremely variable. One may cope with this to a certain extent. The technique described corresponds to a simplified method of gas storage and offers new facilities for storage at the temperature of the store.

Wooden packaging for fresh fruits and vegetables in relation to the produce and its need for air circulation. T.van Hiele. Institute for Research on Storage and Processing of Horticultural Produce, Wageningen (The Netherlands). Fresh fruit and vegetables are packed in many types of wooden packages and in view of a more efficient trading it was envisaged by the Economical Commission for Europe that some standardization of this material might be desirable.

Storing chestnuts in polyethylene film box liners. J. Lipovec. Fruit Department Agricultural Station, Maribor (Yougoslavia). Storing fresh chestnuts in polyethylene film box liners at a temperature of 0°to -1°C. has proved successful.

Refrigeration requirements in the handling of dairy products. W.G.Wearmouth. National Institute for Research in Dairying, Shinfield, nr.Reading (United Kingdom). It has long been recognized that liquid milk must be kept cool if rapid spoilage is to be avoided. Over the years, suitable equipment has been developed to ensure this. Recently, new techniques whereby milk is collected in bulk from farms have been introduced. The resulting refrigeration problems are described.

The need for lower temperatures in the distribution of fish. G.H.O.Burgess and C.L.Cutting, D.S.I.R. Humber Laboratory, Hull (United Kingdom). Although it has long been known that temperature is by far the most important factor influencing the rate of spoilage of fresh fish, a very little is known about temperatures actually encountered under industrial conditions. Suggestions are made for improving existing methods of handling and processing.

Standard methods for estimating and inspecting the quality of cold stored foodstuffs. S.Kilcristea. Food Research Institute, Bucarest (Rumania). The author presents the most suitable physico-chemical methods of analysis to determine the quality of some foodstuffs which are important either for their nutrient value or for the cold store space required.

The cold storage life of foods as a function of temperature. R. Plank. Technische Hochschule, Karlsruhe (Germany). In the course of calculations or graphical representations of the permissible storage time of foods during which a predetermined quality loss is reached, it is advisable to use the temperature-quotient given by the author and elucidated by him.

The hydrature and differential hydrature of foods. Changes occurring during cooling and freezing. G. Torok and E. Almasi. Forschungsinstitut Konserven-,Fleisch- und Kuhlindustrie in Budapest (Hungary). One of the most important components of our foods is water. Its importance has been pointed out by recent colloid chemical research and by the examination of macromolecular structures and systems. Distortions of the functioning of enzymes and changes in permeability of the cell wall were studied.

Direct and indirect bacterial counts as possible objective indices for the incipient spoilage of chilled protein food products. G.L.Noskova and G.J.Peck. Scientific Research Institute of the Refrigerating Industry of the U.S.S.R., Moscow (U.S.S.R.) Of the numerous objective methods for determining the initial spoilage of protein foodstuffs, up to the present time not one has received extensive application. The authors present the fruits of their research in this field.

A new technique for the measurement of texture changes in fish muscle, and its application in assessing the quality of cold stored material. R.M.Lowe, D.S.I.R., Torry Research Station,Aberdeen (United Kingdom). The paper describes a new method for measuring cold storage deterioration in fish, in which the fragility of individual muscle cells is measured collectively.

Problems of colour condition of frozen tuna meat on cooking. T. Yamamoto. Japan Export Frozen Marine Products Inspection Corporation, Tokyo (Japan). A great deal of tuna,canned from frozen tuna, is rejected, because of undesirable colour changes (such as green or tan) which occur during steaming. Such frozen tuna could be used for some other purpose if its cooked colour could be forecast prior to cooking. Such a method is suggested.

(contd. on page xli)

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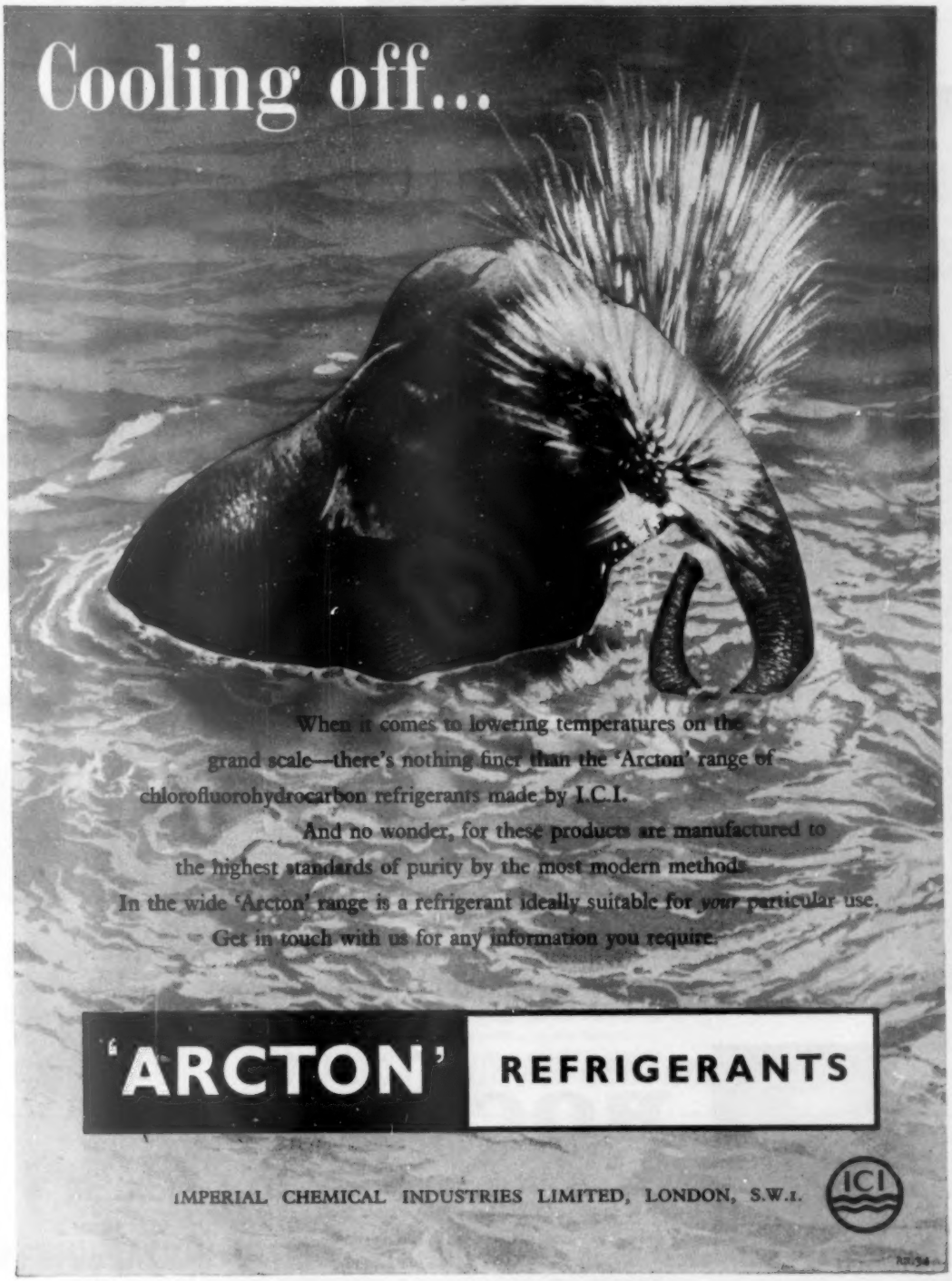
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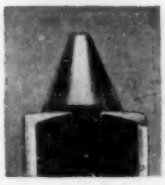
STEEL NEEDLE AND BRONZE SEAT

needle *(note groove)*

seat *(note pear shaped cavities)*

SEMI-PRECIOUS STONE NEEDLE AND BRONZE SEAT

needle *(no groove)*

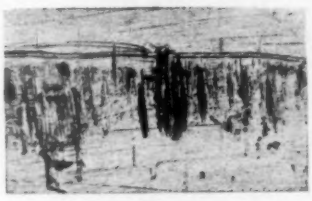


seat *(some corrosion)*

STEEL NEEDLE AND PLASTIC SEAT

needle *(note groove)*

seat *(destroyed)*



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needle *(no groove)*

seat *(only superficial marking)*

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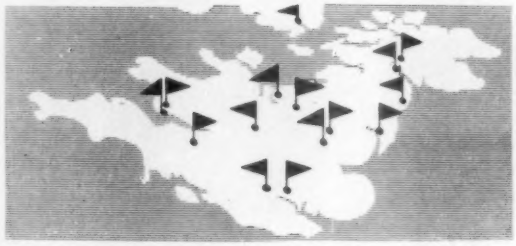

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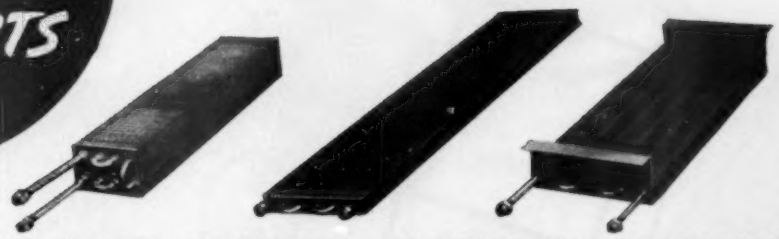

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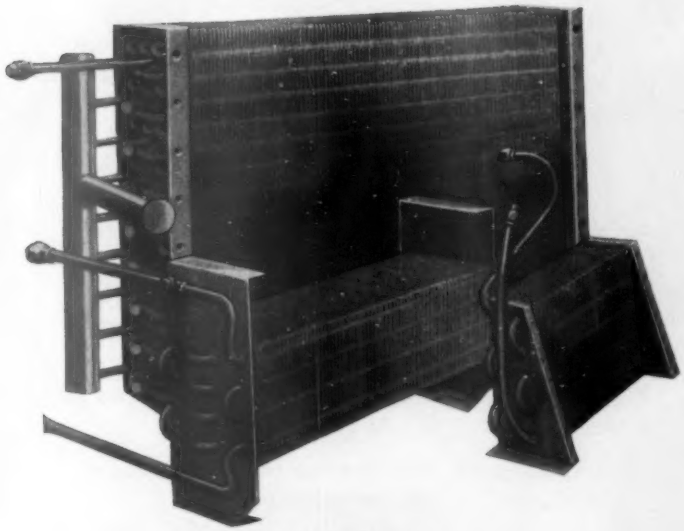

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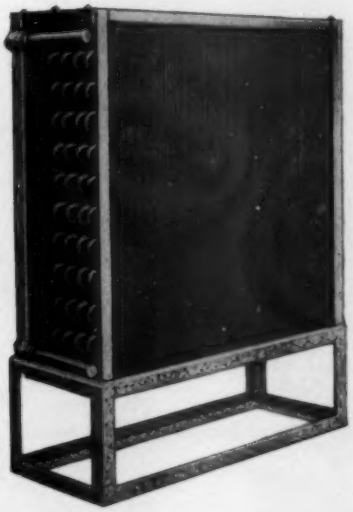

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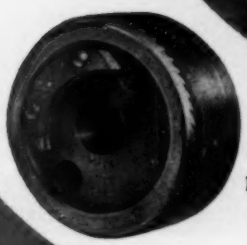

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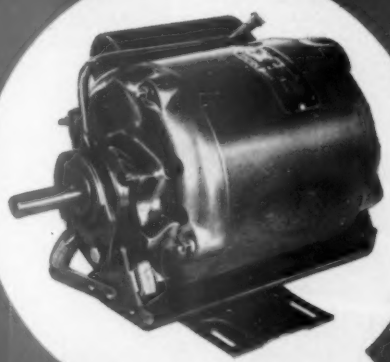

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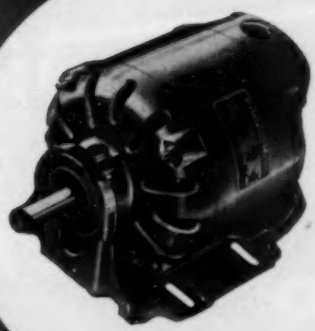

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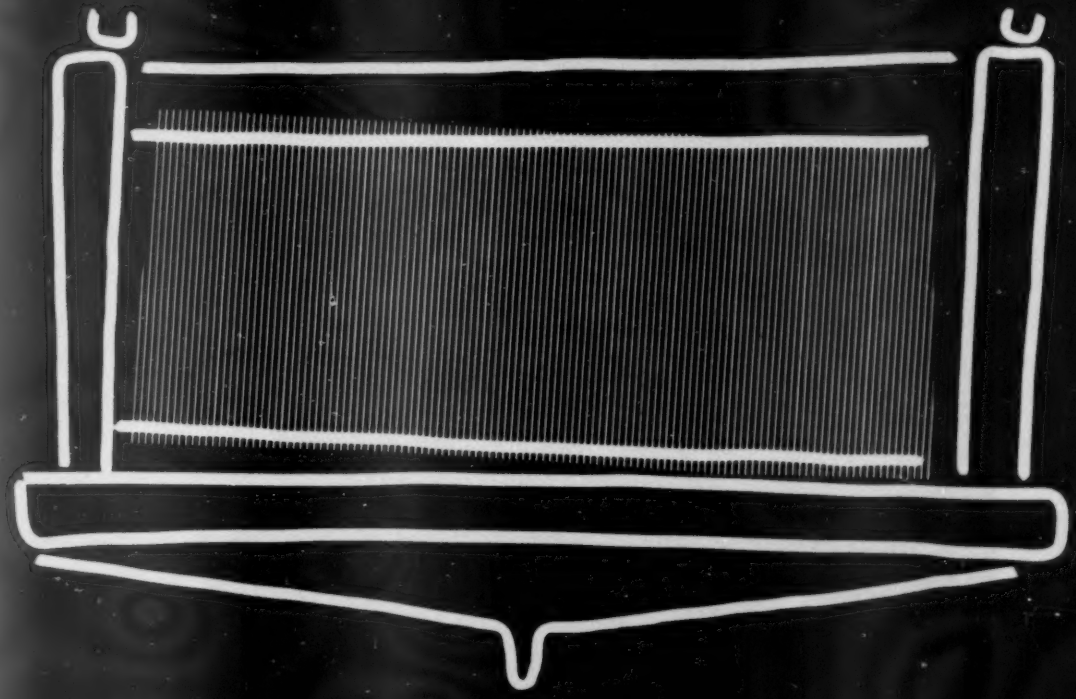

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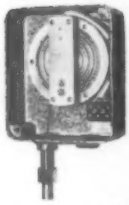

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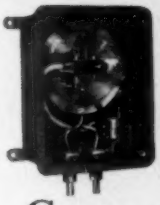

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		°F.	°F.	°F.	°F.	°F.	°F.		in. in.
TSK–56–A	Domestic & Comm. Cabs.	5	22	17	32	26½	39	no	35 & 78
TSK–56–B	Domestic	− 9	12	8½	25	20	33	no	35 & 78
TSK–56–C	Domestic	4	16	8½	25	17½	32	with	35 & 78
TSK–56–D	Absorption	15	25	23	32	30	38	with	35
TSK–56–F	Ice Cream...	−20	− 7	− 3	3	3	11	no	78
TSK–56–G	Frozen Food	−25½	−11	− 9½	1½	1½	10½	no	78

NOTE.—Warm = No. 1. Medium = No. 4.
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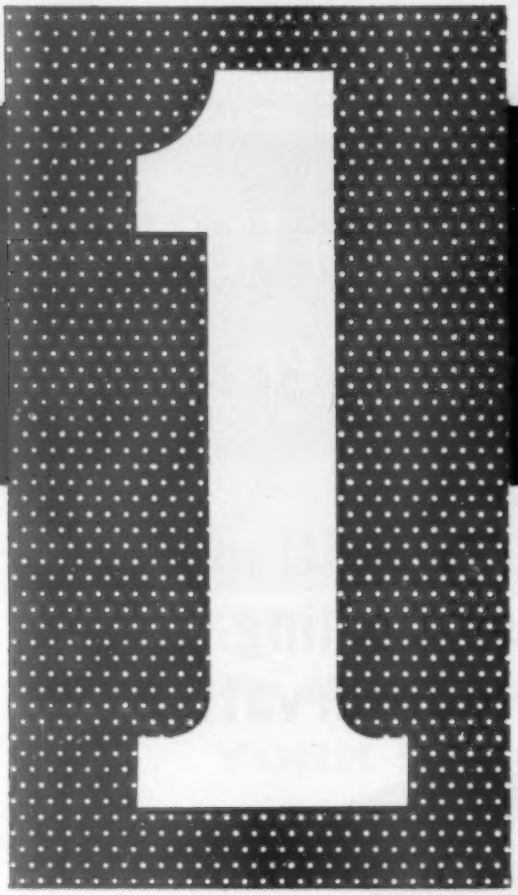

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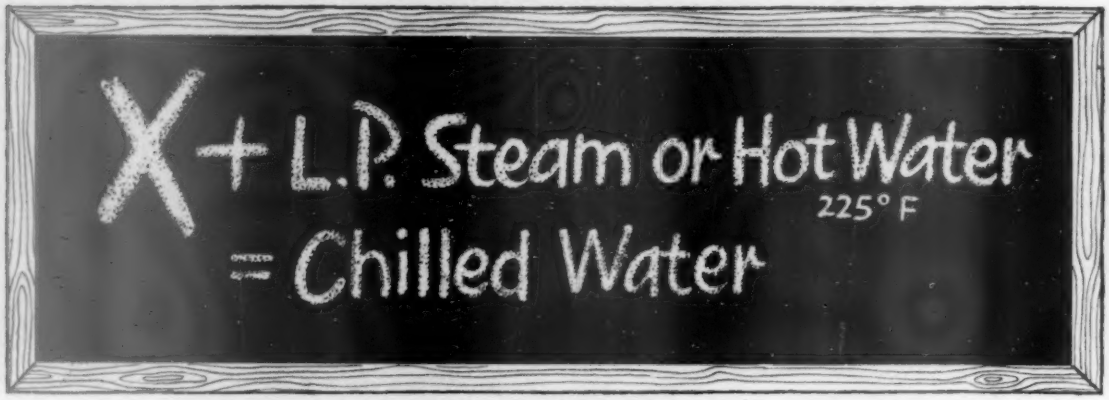

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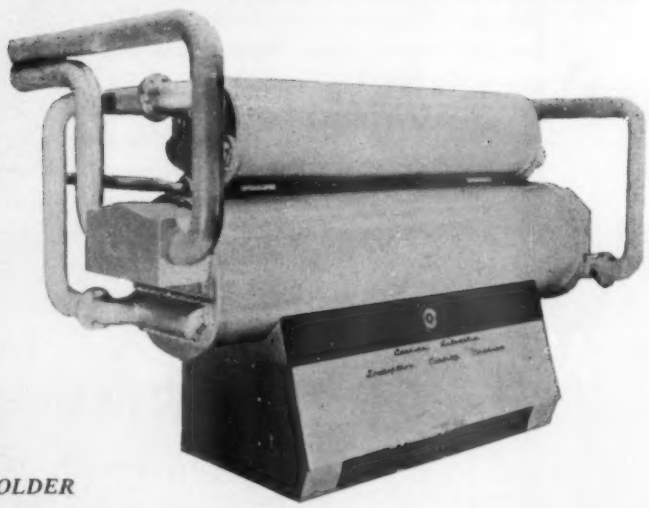

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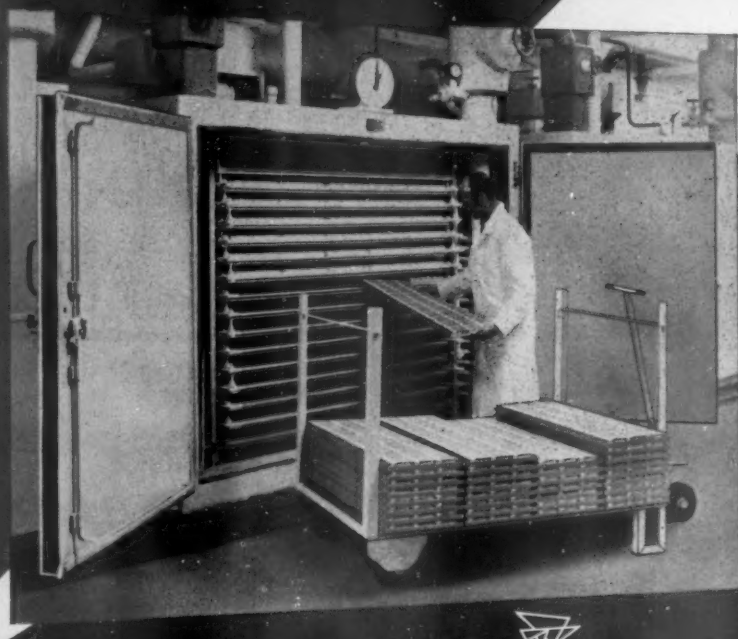

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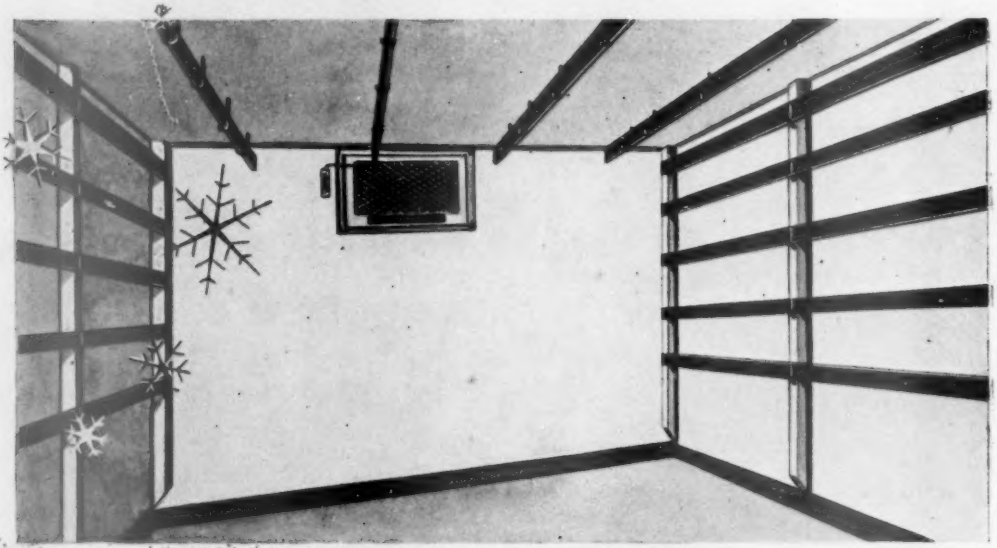

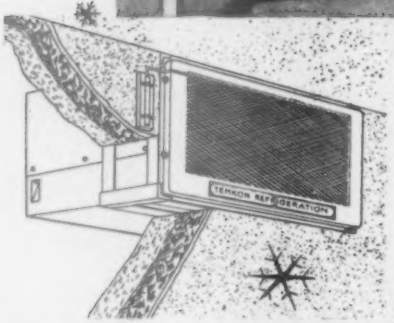

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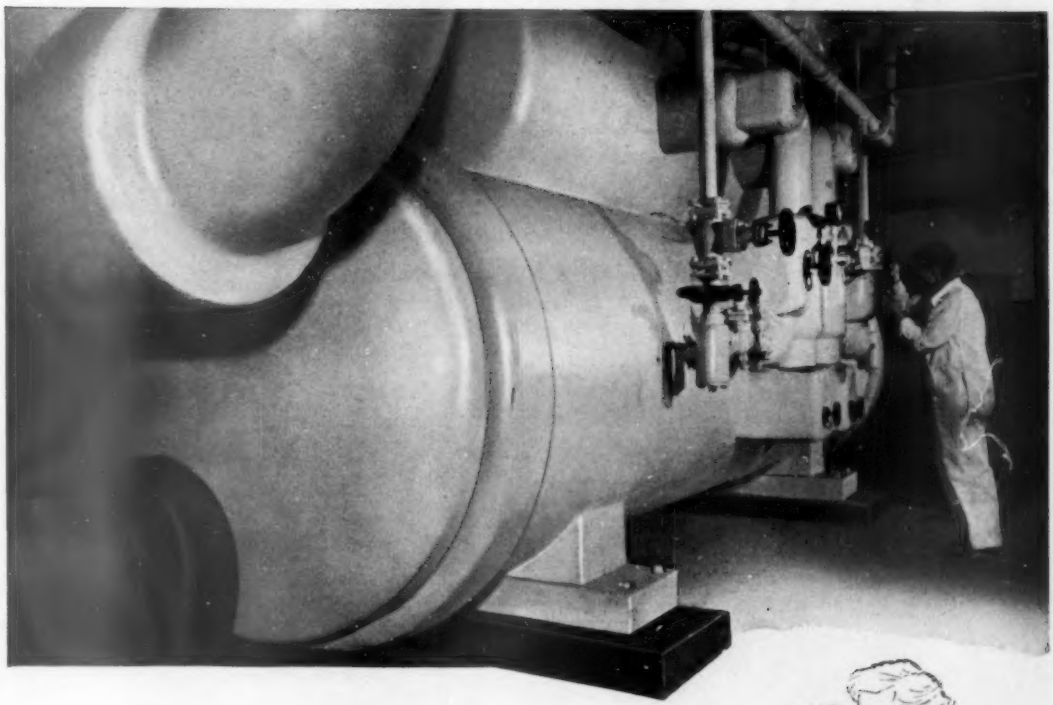

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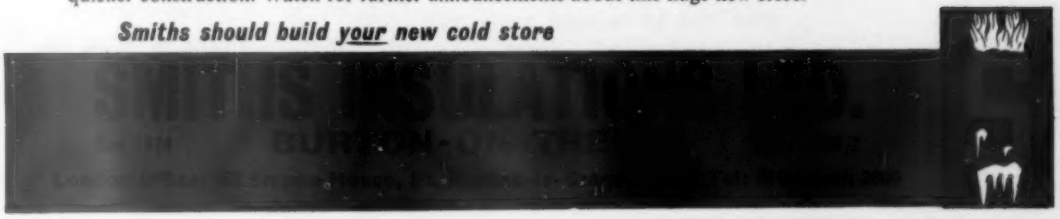

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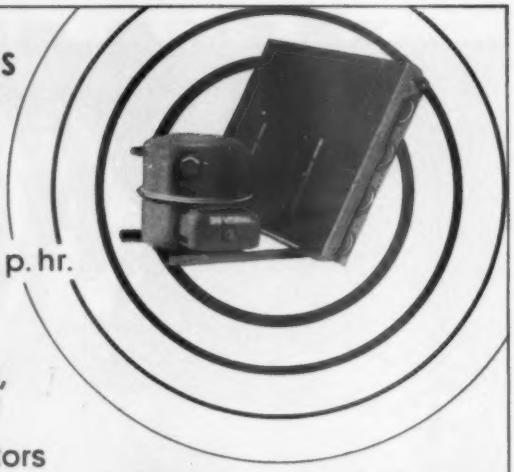

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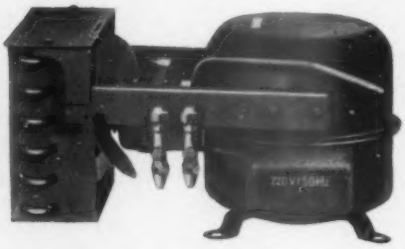

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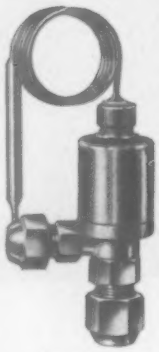

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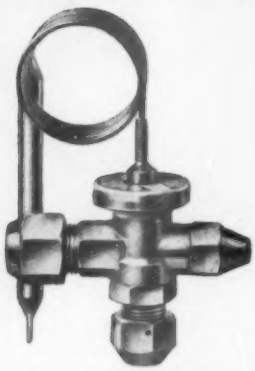

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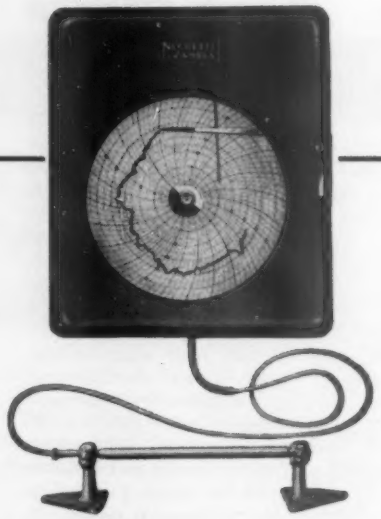

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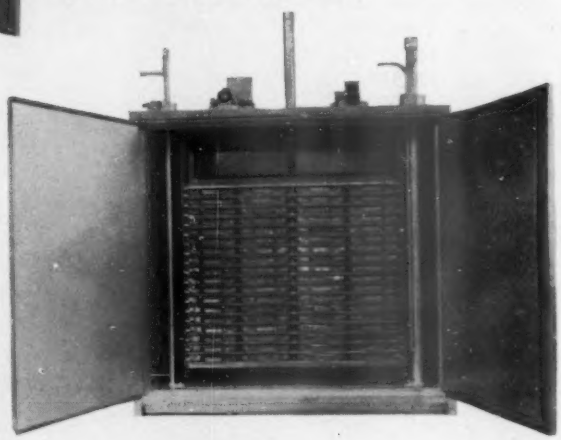

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Physico-chemical properties of frozen beef stored at -14°C. W. Pezacki, B.Dzierzynska-Cybulko, St-Nawrocki. Centralny Zavzad Przemyslu Chlodniczego. Warszawa (Poland). The purpose of the present work was to state what sort of boneless, ground beef, frozen and stored at a temperature of -14°C. is best for production of non-stable, scalded sausages.

Investigation of heat transfer and weight loss during freezing of meats. G. Lorentzen and S. Rosvik. Norges Tekniske Hogskole, Trondheim (Norway). The freezing of meat for storage or long distance transport has gained considerable importance in many countries. For the selection of the most suitable air conditions and design of the freezers, it is necessary to have detailed knowledge of how factors such as air velocity and temperature influence the freezing time, weight loss and product quality. Some results of a series of measurements bearing on these questions are reported.

The effect of Turkish slaughtering customs and native cuts and packing material on frozen storage time and quality of meat. O.N.Kocturk. Central Research Laboratories of Meat and Fish, Ankara, (Turkey). Research work has been done by Central Laboratories of Meat and Fish Organization to determine the frozen storage time of beef, lamb and poultry which were slaughtered and divided into certain cuts according to local customs.

Quality evaluation in frozen fruits and vegetables by means of chemical and physical tests. M.J. Copley and D.G.Cuadagni. U.S.Department of Agriculture Albany, California (U.S.A.). A broad, long-range study on the time-temperature tolerance of frozen foods has revealed a number of chemical and physical tests which may be used as measures of quality changes in frozen fruits and vegetables subjected to adverse temperature conditions during storage, transportation and distribution.

Quality changes in frozen vegetables during simulated distribution. W.F.Talburt and E.A.Beavens. U.S.Department of Agriculture, Albany, California (U.S.A.). Quality deterioration and chemical changes are negligible in frozen vegetables stored at -20°F (-29°C) up to five years, but are measurable after two years at -10°F (-23°C). Rates of change increase rapidly with temperature, and severe quality losses occur under time-temperature conditions sometimes encountered in commercial operations.

Decay forecasts reduce storage losses in grapes and apples. J.M.Harvey. U.S.Department of Agriculture, Fresno, California (U.S.A.). Infection of certain fruits and vegetables by decay organisms in the field has been demonstrated to be the primary cause of spoilage in storage. A method has been developed to measure infections at harvest, thereby providing a means of forecasting decay in storage.

Investigation and application of freeze-drying of foods. G.B.Tchigeov. Leningrad Technological Institute of the Refrigerating Industry, Leningrad (U.S.S.R.). Research carried out during recent years has been devoted to the physics of sublimation and desublimation at low pressures, and also to the transfer of water vapour under such conditions. The results of such investigations are being used in the perfection of methods of evaluating drying processes and equipment, the improvement of design as well as for the determination of optimum drying conditions.

Freeze-drying a modern preservation method for highly perishable foods. L. Groschner, O. Hamann and M. Scharnbeck. Forschungsinstitut fur die Kuhl- und Gefrierwirtschaft, Magdeburg (Germany). This paper contains results of tests of the vacuum freeze-drying of foods.

Time requirements for processing freeze dehydrated foods. M.C.Brockmann. Quartermaster Food and Container Institute, Chicago (U.S.A.). The advantages of freeze dehydrated products for military feeding are described. The freeze drying of food is characterized by three phases.

Ultraviolet radiation as a factor prolonging the storage life of foods. N.A.Golovkin, Leningrad Technological Institute of the Refrigerating Industry, Leningrad (U.S.S.R.). Ultraviolet radiation is more effective at low temperatures above 0°C than below. The lethal effect of ultraviolet radiation upon microorganisms is more intensive during the early stages of their development. A drop in the ambient temperature retards their development and hence contributes to the effectiveness of radiation.

Carbon dioxide as a means of prolonging the storage life of chilled fish products. A.P.Makashev. Krasnodar Branch of VNIIKOP, Krasnodar (U.S.S.R.). Carbon dioxide dissolving in the muscular tissues of fish brings about a number of changes in them. Of these the most important are: infringement of the osmotic equiplibrium, increase in the hydrogen ion concentration, increase in proteolytic enzyme activity, transition of haemoglobin to methaemoglobin.

The use of glazing and low temperatures in the storage of frozen sprat. A.I.Piskarev, A.K. Kaminarskaya, L.G.Lukyanitsa. Scientific Research Institute of the Refrigerating Industry of the U.S.S.R., Moscow (U.S.S.R.). One of the important problems in the fish industry is the utilization of frozen fish for the manufacture of various canning foods. Laboratory and industrial tests have been carried out by the VNIKhl on the storage of glazed blocks of frozen sprat (Clupea harengus membras Linne) at -35°, -25° and 18°C to be later canned.

Antioxidant treatment of rainbow trout. F.Bramnaes. Fiskeriministeriels Forsbgslaboratorium, Copenhagen (Denmark). Rainbow trout is a fats fish containing about 5-10 per cent fat. It is

often sold frozen in carton retail containing two dressed trout. A major storage problem is rancidity in the fat. The correlation between flavour score and peroxide value was examined. The correlation coefficient calculated was 0.88. The high significance of this value indicates a linear relation between the two characters.

Refrigeration of salmon for canning. E. Tanikawa and T. Motohiro. Faculty of Fisheries, Hokkaido University, Hakodate (Japan). When frozen salmon is used as the raw material for canning, some smell called "freezing smell" assails one's nostrils upon opening the cans. The authors have studied the cause of the formation of that smell, employing salmon caught in the Bering Sea.

The microbiological state of intermittently-heated meat products kept under refrigeration. O. Dahl. Scan's Centrallaboratorium, Malmo (Sweden). The results of a bacteriological examination of five different meat products, packed in evacuated and sealed Rilsan bags, cooked twice at 100°C and stores under refrigeration, have been reported upon.

Experiments on the storage of some meat carcases with an antibiotic: the chlortetracyclin chlorhydrate. Sabrazin and Vidal. Laboratoire de Recherches; S.A. Entrepots Frigorifiques Lyonnais, Lyon (France). These experiments are based on the use of bacteriostatic power of the chlortetracyclin chlorhydrate to delay bacterial deterioration in meat.

Influence of chlortetracyclin hydrochloride and alkaline polyphosphates in poultry refrigeration and cold storage. A. Valdecantos Jimenez, R.P.Fernandez and M. Estada Girauta. Centro Experimental del Frio, Madrid (Spain). A study on the influence of chlorotetracyclin hydrochloride and alkaline polyphosphates on storage time of refrigerated films has been made. The protective action of some, Cry-O-Vac and national polyethylene, were also studied. In the work a large number of possible combinations, using as variables the chlorotetracyclin, polyphosphates and films were considered.

Effect of polyphosphates and pH on the texture of frozen pork sausage. J.Wismer-Pedersen and A. Sivesgaard. Slagteriernes Forskningsinstitut, Roskilde (Denmark). During storage of frozen, raw pork sausage the texture usually deteriorates. Deterioration is most likely due to alterations of the meat proteins resulting in decreased water holding capacity. As polyphosphate and elevated pH are known to increase the water holding capacity of meat proteins, the effect of these has been studied on the quality of pork sausages stored at -20°C up to 10 months.

The storage conditions and weight loss of frozen meat in jacketed cold storage rooms. D.G. Ruton and P.A.Alekseyen. Scientific Research Institute of the Refrigerating Industry of the U.S.S.R. Moscow (U.S.S.R.). Experiments were carried out in 1956-1957 on the storage of frozen meat in a jacketed cold room at the Moscow No.12 Cold Store. The temperature of the air was maintained automatically at -18°C in the room and at -18° to -19°C in the jacket.

Radiating chill room for pork and beef. A new method for the chilling of fresh slaughtered carcasses. A. Korsgaard. Thomas Tho. Sabroe and Co., Aarhus and H.C.Larsen. A/S Norproduct Ltd., Copenhagen (Denmark). These new chill rooms are built very differently from conventional rooms with forced air convection. Evaporation (shrinkage) is less than in other chill rooms and the maximum refrigerating machinery needs only 60-70 per cent. of that of a quick chill room, because the refrigerating effect is not as great during the first 2-3 hours as by quick chilling.

The use of the quick freezing in conjunction with an additional process to lengthen the consistence of butter. E. Groseghner and W. Eichwald. Forschungsinstitut fur die Kuhl- und Gefrierwirtschaft, Magdeburg (Germany). The problem of storing butter and keeping its high quality up to one year has not been solved satisfactorily yet, when cold alone had been applied. Failures are due to the varying initial qualities of butter to be stored. Quick-freezing is advantageous if good basic features are on hand.

The effect of waxing and quick cooling on the storage of eggs. A. Tschiobanou, S.Khristea and A. Racovitza. Food Research Institute, Bucarest (Rumania.) The effect of waxing on eggs has been studied, taking account of their freshness and their storage conditions, as well as the effect of quick cooling on unwaxed eggs. After three months storage the best results were obtained for waxed eggs stores at subcooling temperatures ranging between -1.5° and -2.5°C.

Controlled atmosphere storage of fruit in the U.S.A. R. M. Smock. Cornell University, Ithaca, New York (U.S.A.). The first commercial development of gas storage of fruit in the U.S.A. took place in the early 1940's. There is now a storage capacity of more than three million boxes, chiefly in New York and Michigan.

The condition for the gas storage of certain fruits and vegetables obtained by the use of a simple small scale method. R.G.Tomkins. D.S.I.R., Ditton Laboratory, Maidstone (United Kingdom). Reasonably constant conditions can be maintained for long periods. Data have been obtained and will be presented on the effects of temperature and concentration of carbon dioxide and temperature on storage of fruits and vegetables; the effect of ripeness on susceptibility to carbon dioxide injury; the effect of storage conditions on the production of ethylene.

The application of high concentration of carbon dioxide in transport and storage of some fruits. W. Hugh Smith, D.S.I.R. Ditton Laboratory, Maidstone. (United Kingdom). It has been found that blackcurrants for processing can be stored with advantage in 50 per cent carbon dioxide. Probably the best conditions are 50 per cent carbon dioxide for one week followed by 25 per cent.

carbon dioxide for the remainder of the period. A temperature of 35°F is suitable. Under these conditions blackcurrants have been stored in bulk for one month.

The control of superficial scald of apples. J.C.Fidler. Ditton Laboratory, D.S.I.R., Maidstone (United Kingdom). The standard method of control of scald, i.e. the use of oiled paper wraps, is less used now than in past years. This is partly because it is a waste of labour. Further, with certain varieties the method is inefficient. The most significant advance in recent years in the use of organic compounds (e.g. diphenylamine) in dilute solution, applied as a dip or spray, or impregnated in a wrapper.

Tests on cold treatment and storage of spanish oranges. J.A.Munoz-Delgado Ortiz, L.Munoz-Delgado-Oritz, A.Valdegantos-Jumenez and M. Estada Girauta. Centro Experimental del Frio, Madrid (Spain). The authors have made a study of cold treatment and storage of Spanish oranges, Navel, Sanguina and Valencia tardia varieties, in order to find the best conditions to be used in these cases.

Freezing of chestnut in the South-East region of France. Vidal and Roussel. S.A.Entrepots Frigorifiques Lyonnais, Lyon (France). The authors have already studied this problem for several years. The cold storage of chestnut for industrial requirements results in excessive losses. Those are mainly due to a time of storage of several months for industrial requirements. Only freezing could limit these losses to the strict minimum. Various processes for preparation before freezing have been tested in close cooperation of the laboratory of the "Entrepots Frigorifiques Lyonnais" and processing manufactures.

Gamma irradiation of fruit to increase their cold storage life. Brunelet and Vidal. Societe Conservatome, Lyon (France). Exposure to gamma rays results in double or triple storage life at +4°C. The fruit are not wrapped in airproof packages. The optimum dose seems to be 200,000 rad. The results vary with the kind of fruit and with their stage of ripening; the latter must not be too advanced.

Irradiation of apples by gamma irradiation. W.R.Phillips and K. F. MacQueen. (Canada). Apples harvested in 1957 and 1958 were exposed to radiations of various intensities and were subsequently examined for factors associated with storage behaviour. It is not proposed that irradiation of apples will have an immediate application in apple storage. These experiments at least suggest a control of a disorder which is of extreme economic importance.

New adsorption tests of volatile compounds discharged by fruit in cold rooms. C.Antoniani, A. Monzini and G.P.Kaderavek. Stazione Sperimentale del Freddo, Milan. (Italy). It is known that the evolution of ethylene by fruit during storage reduces keeping time even in cold rooms. The use of brominated carbon and of molecular traps for the adsorption of ethylene does not give satisfactory results.

Long term storage of chincherinchees (Ornithogalum thyrsoides, hybrid strain Harry de Leew). L. Ginsburg. Western Province Fruit Research Station. Stellenbosch (South Africa). An important chincherinchee bulb growing industry has recently been developed in South Africa. Storage of the blooms for 6 to 8 weeks greatly enhances the market value of these flowers. Tests were conducted with blooms picked at two stages of development viz (1) raceme tightly closed, (2) two floret buds at the base of the raceme showing white.

Freezing as applied to the process of drying soya-bean curd. S. Kato. Japanese Association of Refrigeration, Tokyo (Japan). "Kogori-tofu" one of the most familiar articles in Japanese diets and very rich in protein, is a dried "tofu" (a molded protein curd from soya-beans) obtainable by means of freezing, defrosting and final drying. White "tofu" changes into an unpalatable mass by merely drying, because it shrinks to poor amber-like gel that hardly rehydrates when cooked, an application of freezing as a pretreatment of drying produces so-called "Kogori-tofu" a yellowish white spongy solid which becomes desirably soft and delicious by cooking.

Evaporation of moisture from products during freezing in an air blast. A.B.Khachaturov.Scientific Research Institute of the Refrigerating Industry of the U.S.S.R., Moscow (U.S.S.R.). The author has carried out an experimental investigation at VNIKhl into the mechanism of the evaporation of moisture from fish during freezing. It has been found that increase in the air velocity and in its temperature diminishes the shrinkage of fish. Thus on raising the air velocity from 1 to 10 m/sec the loss in weight of fish during the freezing period becomes less by 3.2 times.

The sources of the different psychrophilic spoilage organisms on chilled eviscerated poultry.E.M. Barnes. Low Temperature Research Station. Cambridge (United Kingdom). It has been found that the spoilage organisms of eviscerated poultry stores at 1°C are generally strains of pigmented and non pigmented Pseudomonas and Achromobacter with the non pigmented Pseudomonas predominating on the spoiled carcases. A study has been made of the distribution of these and other psychrophilic bacteria in a poultry plany.

The survival of bacteria on frozen meat and their growth after thawing. A.G.Kitchell and M. Ingram. Low Temperature Research Station, Cambridge (United Kingdom). It cannot be assumed that the response of bacteria to freezing and thawing on agar will be the same as on meat. Further

work has been done on conditions at the surfaces of thawed meat to decide which factors could permit a more rapid development of spoilage bacteria than on fresh meat. So far, no basis has been established for assuming a greater perishibility of thawed meat.

Determination of time required for freezing of whalemeat. K.Tanaka. Tokyo University of Fisheries, Tokyo (Japan) and J. Nishimoto, Faculty of Fisheries Kagoshima-city (Japan). To determine the freezing time of a rectangular shape of whalemeat, a new formula has been used by the AA. The paper is a mathematical treatise which is elucidated.

The following abstracts are to appear later:- Commissions I, V VI, VII, VIII and IX.

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DEEP MINE AIR-CONDITIONING

In an address which he made at Boksburg town hall, South Africa, to celebrate the achievement of East Rand Proprietary Mines Ltd's engineers in reaching the world record mining depth of 11,000 ft. below surface, the chairman, Mr. P. H. Anderson said, in part:

"At about the same time as the longwall stopes were being started it was decided to alter the method of ventilation. The system in existence at that time, the foundations of which were laid down in 1906, consisted of a series of forcing fans far removed from the current stoping areas and leakage was difficult to prevent. The long wet passages to depth made the air excessively humid and hot and there was no direct control of the return air, which found its way to surface through stoped out and abandoned areas and incline shafts. These, as airways, were unreliable, inadequate and frequently inaccessible. Under these conditions it was impossible to control the flow of air to give adequate ventilation to all working places. Furthermore, in certain portions of the mine, ventilation conditions were deteriorating steadily due to the partial closing by pressure bursts of key return airways through dyke and fault barriers in abandoned workings."

"Management subsequently developed and extended the system of delivering air at high velocity and took additional steps to improve the quality and the quantity of the air circulating through the mine. Thus cooling plants are now a major feature of the mine's ventilation system. The progress made since the mine first pioneered the installation of an underground cooling plant in 1935 has been great, and this is due in no small measure to the research and development work done on underground cooling towers and spray chambers. The surface and underground cooling plants at the mine at present have a combined capacity of 3,500 tons of ice a day, and in the near future this will be increased to 4,300 tons. One of the deep level cooling plants situated on 58 level is being altered in order to pipe the cooling water from the plant for a distance of 5,000 feet down an incline shaft in order to carry out the air cooling operation nearer to the working face. It is, however, not easy to achieve good quality air unless there is also adequate quantity. The mine has always striven for "volume of air," and to-day circulates 2,000,000 cubic feet of air every minute; this corresponds to 60 tons of air every minute or 86,000 tons a day. For every ton of ore hoisted 10 tons of air is sent down the mine. 12,000 horse-power is consumed in supplying and cooling the air".

"All these measures, coupled with close control of the ventilating currents, have resulted in very satisfactory wet Kata readings being attained even in the deepest stoping areas; for example, in the stopes being worked from 8,000 feet to 9,500 feet below surface, the wet Kata readings average over 10. The six deepest longwall stope faces are each supplied with an average air volume of 55,000 cubic feet per minute; the mean wet bulb temperature is just under 90 F. Although the air is nearly saturated, the excellent air control ensures that the velocity at the working faces in the longwall stopes in the deeper portions of the mine averages over 800 feet per minute, resulting in reasonably comfortable conditions despite the high temperature."

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RESEARCH AT TORRY.

A visit to the U.K. Fisheries "Lab"

The Torry Research Station of the DSIR was at home to visitors in mid-June, with particular emphasis on the more recent work of the station. This includes freezing at sea, where the economics of part-freezing type trawlers have been specially investigated; antibiotic use to determine how far the use of antibiotics will assist preservation of distant water catches; temperature factors governing quality at various stages of distribution and dielectric thawing which promises to be a most useful technique in the handling of frozen foods.

Much of this work is still in the prototype stage and as yet remains to be proved in commercial practice from the economic viewpoint. In this context the various sections of the industry are co-operating increasingly, demonstrating the new approach of the fish trade to all its problems. Dr. Reay offered the view that this new thinking - already evident over the past ten years - will undoubtedly change the whole approach to fish catching, distribution and preservation with the prospect of fairly considerable changes taking place of the next 20 years. In many cases ideas and propositions which were given a cautious reception originally are now being accepted and considered. Factual application is the next stage, and the view taken at Torry is that many of the proposals are now at the break-through stage at which acceptance and commercial application can be expected.

Among the particularly interesting work, mention might be made of the following:-

DIELECTRIC THAWING OF FROZEN FISH

The industrial thawing of frozen fish, which normally takes up to 24 hours in air can now be done in about 15 minutes by dielectric heating. This new development, which solves a major problem in the fish industry, is of great economic importance, especially in view of the steadily increasing large-scale utilisation of frozen fish and may have wide application in other sections of the food industry. Dielectric thawing depends on the fact that if any material is placed between, but without touching, two metal plates which are charged with an alternating voltage of many thousands of volts as a frequency of about 40 million cycles per second, energy is produced in the material in the form of heat. Under well defined conditions fish may be uniformly thawed throughout a block of the frozen material either as whole fish as in the case of herring or as fillets. It is possible to control conditions far more accurately than in existing methods, for example, so that individual fish in a block may be separated while remaining partially frozen.

Laboratory scale experiments at the Torry Research Station had shown that it was possible to use dielectric heating succesfully on tiny pieces of frozen fish. Pilot scale apparatus, using slightly modified equipment which is commercially available, was therefore set up. Initially the problem of 'runaway heating' was encountered; small portions of blocks of fish absorbed the major part of the available energy and became cooked, while the rest of the block remained hard frozen.

This problem has now been solved and fish may be fed into the machine on an endless belt and thawed in 15 minutes. The implications of this work are very wide. At present fish is thawed by laying it out in the air; it is sometimes, in addition, sprayed with water. Under these conditions fish on the outside of a block thaws quickly and begins to deteriorate while that in the middle remains frozen. Apart from possible deterioration however, existing methods are slow, require much labour and factory space and are unsuitable for fish factories with production lines. The new method requires no handling during thawing, is quick and therefore keeps deterioration to a minimum, and the equipment occupies only a few square yards of floor space. The capital cost - about £10,000 for equipment to thaw one ton of fish per hour - is comparable to that for freezing equipment of the same capacity. Running and depreciation costs appear to compare favourably with the costs of existing methods of thawing. The potential results of this development, which is the subject of a patent application, are such that they could revolutionise certain sections of the fish handling and processing industry in a relatively short space of time.

FREEZING AT SEA

Work on part time freezing trawlers was also covered. One of the most effective ways of reducing costs is to arrange for the trawler to spend a longer time on the fishing grounds. The limitations of the use of crushed ice as a preservative cut short the stay on the fish ground

even though the hold is not full. A better method of preservation would allow the stay on the grounds to be extended. The best known method of preservation is quick freezing followed by low temperature storage; but freezing plant occupies space and costs are high and the fish have to be thawed after landing. It may be thought that the increased costs of freezing as compared with more orthodox methods of preservation will more than offset any possible savings through extension of voyages at least until much larger trawlers are built, but this is not the case, because additions to savings are possible if the trawler is designed and operated so as to take full advantage of the freezing process. For instance, sea-frozen fish landed during the summer months when supply exceeds demand by up to 15 per cent can be stored until times of scarcity, instead of being sold for manufacture into fish meal, at a loss of over 30/- per kit. The most important potential savings are however in fuel and propulsion machinery costs. Trawlers have now been built with machinery which develops constant power over a wide range of conditions; both diesel electric machinery and controllable pitch propellors can give this characteristic which is analogous to an infinitely-variable gearbox. The power required when fishing has recently been shown to be 600 s.h.p. or less whereas the latest trawlers have power of 1500 s.h.p. or more. The speed obtained at 1500 s.h.p. is only about 4 per cent higher than at 1125 s.h.p. and if allowance is made for reduced weight of machinery and fuel the real gain is even less. With an improved method of preservation which allows a longer stay on the fishing grounds the economic optimum speed of the trawler is lower, and the costs of machinery and fuel are very much less.

By using the latest machinery designs it is possible to reduce the space occupied by propulsion machinery and fuel and increase the space and capital available for processing plant and stowage of fish. In this way the voyage of a trawler of 185 to 190 ft. can be extended for several days. The Northern Wave experiment in 1956 demonstrated that whole headless sea-frozen cod was equal to very fresh iced fish and could be processed and handled in all the usual ways after even several months of storage. The fishermen had no difficulty in operating the plant at sea. The method was therefore proved in the technical sense, but economically speaking the advantage of extending the trip could not be demonstrated because of the conditions of the experiment. In the economic analysis of the designs now put forward the costs derived from the Northern Wave were used and it was assumed that headless cod would sell at average prices equivalent to those of iced cod.

In trawlers of 185 to 190 ft. it would still be necessary to stow a considerable proportion - up to two thirds - of the fish at ice temperature because there is still not sufficient space to freeze the whole of the catch. The frozen part of the catch would on average represent the extension of stay on the fishing ground as compared with the normal voyage and the chilled fish would be equal to the normal catch. More than enough would be frozen to avoid the problem of the summer surplus and the average quality of the landings would be increased because of the large quantity of sea-frozen fish. The advantages of this design of trawler are that it is no larger or costlier than existing vessels and fewer vessels are needed but the extension of the voyage is moderate and the thawed fish can be handled by the trade in the same way as iced fish. The freezing plant and the kind of propulsion machinery described have both been tested and proved in service in trawlers. It is desirable to improve the freshness of that part of the catch which would still be kept at ice temperature, so work on these lines is still going on at Torry. Because of the problem of seasonal surpluses and in order to raise the quality of the landings as much as possible, it is better to use improvements in chilling procedures to raise quality and not to extend voyages. If voyages are to be extended it is better to freeze the fish caught during any extra stay on the fishing grounds.

The stage now reached is that two firms are interested in the building of part freeze trawlers although no final decisions have been taken.

CHILLED SEA WATER PRESERVATION

Torry has begun experimental work on chilled sea water preservation. Experience has shown that temperature is the most important single factor affecting the keeping quality i.e. the storage life, of fish. The nearer the temperature is to the freezing point of fish (about 31 F. in cod and haddock) the longer the fish will keep fresh. The usual method of cooling fish at sea for the voyage home is to distribute ice amongst the fish in the trawler's fish room.

Cooling takes place as a result of contact with the ice and water from the melting ice. Unless the ice is used in sufficient quantity and distributed to best advantage throughout the mass of fish the temperature during the voyage home may rise well above that of the ice melt water (32 F.)

One method recently advocated and tested commercially in Canada of ensuring the continuous cooling of the fish at 32 F. is to use chilled sea water stowage. This method could offer many

advantage other than that of cooling, such as the ease of stowage and discharge of the catch; the uniformity of the treatment of the fish and the ease of applying antibiotics if their use were to be sanctioned; the much improved stowage rate - just over 3 cu. ft. per kit compared with 4.37 cu. ft. for bulk stowage; and the avoidance of crushing. Preliminary small scale trials on board a commercial vessel have shown that the fish stowed on aerated sea water, chilled with ice has stowage properties somewhat similar to that of well iced fish. On the strength of the experience gained from these experiments a small pilot scale apparatus has been constructed at Torry Research Station in which the rates of aeration and of circulation of sea water can be varied. Trials are now being made to investigate some of the factors likely to affect the storage of fish under these conditions. Some of these factors are:
Elimination of foaming; effect of aeration; storage of mixed species in the same tank; necessity or otherwise of changing the chilled sea water during a voyage, and if so, how often; storage of fish caught on different days in the same sea water tank.

This work is in its early stages and will be developed steadily.

CHILLING OF FISH IN DISTRIBUTION

Work on effective temperature control during distributionis also in progress. The British fish industry relies principally on the use of ice for effective transport of fish. The target temperature 32 F. the melting point of ice, can be reached only by the proper use of liberal quantities of ice.

A survey was carried out in 1956 and 1957 in which 30,000 temperatures were taken of fish in commercial distribution. The full detailed results have just been published in a report issued by H.M. Stationery Office in the first of a new series of Torry Technical Reports. They show that there are parts of the distribution chain from ship to shop where improvement in freshness would result from the use of more ice. The essential points are that (1) more ice needs to be used by the fish industry generally, and (2) this ice needs to be thoroughly mixed with the fish, if the latter is to reach the consumer in the freshest possible condition.

However various practical and economic difficulties are encountered in applying these two simple lessons commercially, e.g. at some ports ice is not available or is expensive. Nevertheless some firms have put these results into practical use.

SPOILAGE OF ICED FISH

Torry has also been doing work on spoilage of iced fish. This has shown that under the best conditions of icing and stowage the spoilage process of fish such as haddock and cod can be divided into four well defined phases.

Phase I	0 to 6 days caught	- First grade quality
Phase II	7 - 11 days caught	- Second grade quality
Phase III	12 -15 days caught	- Poor to just edible quality
Phase IV	over 16 days caught	- Inedible and usually condemned at landing.

These phases and indeed various intermediate ones can be defined in fairly precise sensory terms; and a taste panel trained to recognise them can assess fairly accurately the quality of a given sample of iced white fish.

OBJECTIVE ESTIMATE OF QUALITY

A major problem facing some sectors of the fish industry is the assessment of the quality of fish and thus of its suitability for a particular process - say, freezing and the manufacture of "fish sticks" Normally quality is assessed at the quayside, in the factory and at the shop by some sensory means i.e. by its appearance and odour. It is known however that such assessments are fallible and hence attempts have been made from time to time to obtain a more objective method of assessing quality. A variety of methods have been proposed, including bacteriological, biochemical, physical, physico-chemical and chemical ones. The most promising one that has emerged from years of work carried out all over the world, is the estimation of a substance known as trimethylamine. This substance is similar to ammonia in many of its properties and is formed by the bacterial breakdown of trimethylamine oxide present in fair quantity in the muscle of all species of marine fish. The amount of trimethylamine in fish flesh can be estimated fairly simply - two analysts could run through about 50 to 60 samples in a working day - There is a good correlation between the quantity of trimethylamine in the flesh and its quality as assessed sensorily by a trained 'taste panel' - the more trimethylamine, the staler the fish.

Examination of several thousand samples of cod has shown that the taste panel grading of the quality of a sample of cod could be correctly predicted from the amount of trimethylamine in the flesh with an accuracy of from 75 to 85 per cent. In other words the changes of a wrong quality being given to a sample from a knowledge of its trimethyl value would be 15 to 25 times out of 100.

For many practical purposes this may be good enough; and the trimethylamine method is in face being used now in Canada as a means of checking the grading consistency of the government fish inspectors. For many purposes, however, the method is too cumbersome and not sufficiently accurate and the hunt for an improved method continues.

METALS AND THE 'METHANE PIONEER' *

A ship which has attracted considerable attention in the last few months is the 'Methane Pioneer'. The reason for the attention, as many readers will be aware, is the fact that this ship was the first to transport liquid methane by sea, and the successful discharge of her cargo has foreshadowed an international traffic in this commodity.

Methane is a gas which is found naturally in conjunction with oil and the problem of what to do with it has vexed oilmen since the first days of the exploitation of the world's oilfields. Where these were near centres of population and industry ("near" in this context meaning whithin pipe-line range) the gas could be conveyed to those areas where there was demand for it, and provided valuable heat and energy. Pipe-lines have been built for this purpose from oilfields in the U.S.A. and in Canada. Where, however, there was no market for the gas, it often went to waste.

One solution was to transport the gas to those areas where there was demand for fuel but which were inaccessible by pipe-line. The idea was conceived of liquefying methane by refrigeration, and this in fact was successfully carried out on a large scale in the U.S.A. An inherent danger in any scheme for the transport of liquid methane is the fact that a certain amount is bound to vaporise into a highly inflammable gas and further development entailing the liquefaction of methane was hindered by a fire which occurred when a tank failed in Cleveland, Ohio, in 1944. Despite this set-back, which under present-day safety conditions could and would be avoided, scientists have in recent years turned their attention to the problem of methane, and an arrangement was reached between the Gas Council in Britain and a United States company to convert a vessel for the experimental carriage of liquid methane from the U.S.A. to specially built tanks at Canvey Island at the mouth of the Thames. The ship chosen was a motor vessel of 4099 gross tons, and her conversion was carried out under Lloyd's Register of Shipping survey. The liquid was maintained at its low loading temperature by means of insulation.

Although liquid methane had previously been carried in barges, it had never before been transported by sea, and its experimental carriage not unnaturally brought certain new problems.

Need to test alloys.

Methane liquefies at a temperature of -160° C(-256°F), in which liquid condition it is reduced to 1/600th of its volume as a gas. Now, at such a low temperature the physical and mechanical properties of metals and alloys can be so changed that under service conditions they could fail in a particularly undesirable manner. Liability to such failure can be assessed by laboratory testing - samples of the metal or alloy are deliberately fractured under specific conditions and changes in the properties of the sample are deduced from the nature and circumstances of the fracture. When, therefore, proposals were made to the society for the tanks in the 'Methane Pioneer' to be constructed of an aluminium-magnesium alloy, about which only limited data was available, it was necessary in the course of survey to ascertain that this type of alloy would not fail in a harmful manner at -160°C. To this end a series of tests was carried out at the society's research laboratory at Crawley, Sussex.

Service conditions simulated.

It was considered that these tests should be based on determining the "notch sensitivity" of the alloy at very low temperature, and two types of test were standardised. Firstly, the U.S. Navy tear test, in which a machined specimen of the material is subjected to a tearing action and measurements are taken of the energy needed to initiate the tear at a notch, as well as that required to propagate the tear, or fracture. The nature of the fracture is also observed. Secondly, the tipper notched tensile test, where a measurement is taken of the load required to break a plate specimen in which a small notch is placed on either side of the test length and through the plate thickness. In both cases the tear starts at the point where the specimen has been weakened, the notch. Thus the tests closely simulate the weakening which, under service conditions, may be caused by accidental imperfections, from which fractures can originate.

* By courtesy of "100 Al" - a bulletin published by Lloyd's Register of Shipping.

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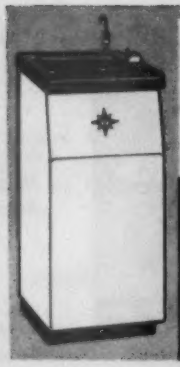

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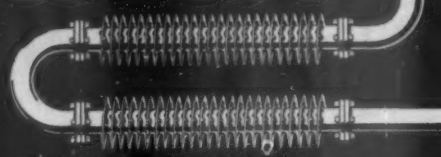

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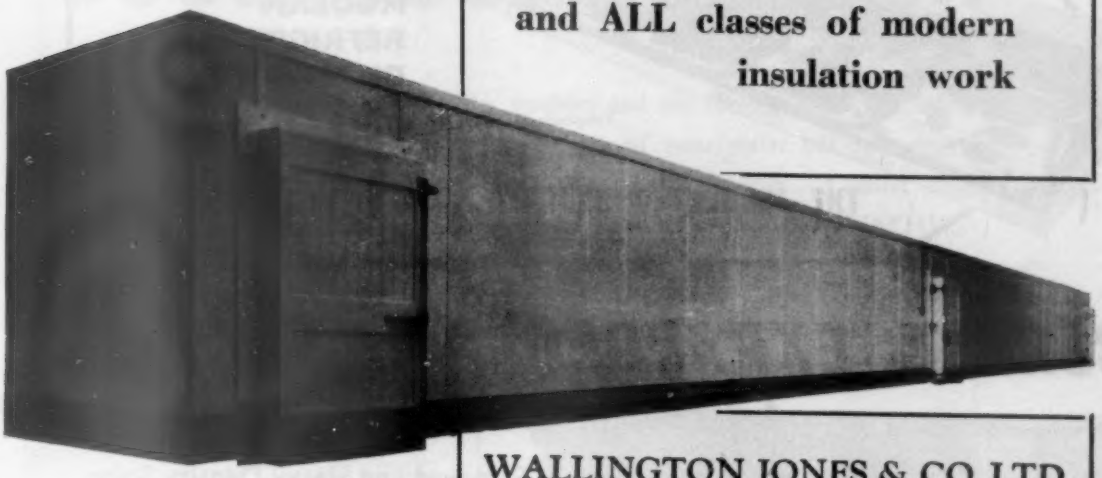

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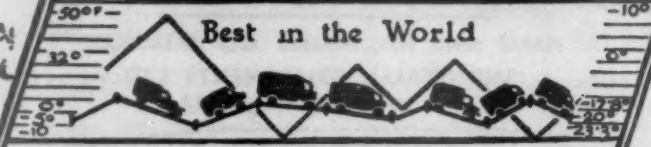

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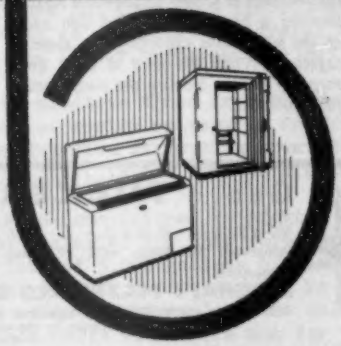

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"RIVET" YOUR ATTENTION

on these pertinent answers to your fastening problems. They tell you of the many advantages to be gained by using "Pop" rivets for every form of assembly.

TUCKER 'POP' RIVETS

Q What is a 'Pop' rivet?

A *It is a tubular rivet assembled on a headed steel mandrel.*

Q In what sizes and materials are 'Pop' rivets supplied?

A *From $\frac{3}{32}$" to $\frac{1}{4}$" dia., in aluminium alloy, mild steel and monel for riveting up to $\frac{1}{2}$" thickness.*

Q What is the operating principle?

A *By means of hand or pneumatic tools the mandrel is drawn through the rivet, forming a head on the blind side and at the same time clenching the sheets together. When the joint is tight the mandrel breaks leaving the rivet head fully formed.*

Q What are the advantages of the 'Pop' rivet?

A *Only one side of the structure to be riveted need be accessible, only one operator required, ease and speed in setting, combination of lightness with strength, foolproof and gradual setting action which eliminates any possibility of damage or distortion of the structure.*

Q How do 'Pop' rivets cut costs?

A *They can be set at speeds in excess of 20 per minute by one unskilled operator.*

They facilitate riveting in hitherto unknown inaccessible positions, thereby reducing design costs.

Geo. **TUCKER** **EYELET** Co. Ltd.

Walsall Road · **BIRMINGHAM 22B**

Telephone: BIRchfields 4811 (9 lines) Telegrams: EYELETS, BIRMINGHAM

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The trade mark "POP" is registered in respect of rivets in the United Kingdom and many other countries in the name of the Geo. Tucker Eyelet Co. Ltd.

Eldwood

(*Frozen Food Cabinets*)

THE COUNTY

COMPACT

LOW PRICES

ATTRACTIVE APPEARANCE

SALES APPEAL

SEALED SYSTEM

MIDDLESEX	ANGLESEY	DURHAM 4
DEVON	KENT	DURHAM 6

GROSS CAPACITY - 10.6 cu. ft.
NETT CAPACITY - - 9.25 cu. ft.
FLOOR SPACE - 52 in. x 26¾ in.
SERVING HEIGHT - - 38 in.

For further details write to:—

L. D. WOOD (ELDWOOD) LTD. · WEMBLEY · MIDDLESEX

LIME-FREE WATER - AN ESSENTIAL PART OF MODERN ICE-MAKING

In spite of the large scale introduction of modern refrigeration methods into the every-day industrial, commercial and domestic life of the nation a considerable demand for fresh ice remains. The use of lime free water during manufacture ensures a product which is free from colour.

One of the oldest established ice-making firms in the London area - United Carlo Gatti, Stevenson and Slaters Ltd - has not suffered as a result of the post-war change-over from 'keeping it on ice' to refrigeration.

The firm operates a fleet of thirty road vehicles engaged in delivering block and crushed ice daily to consumers throughout the Greater London area whilst some wholesale distributors collect their requirements daily from the firm's Battersea plant. Since the war up to date ice-making plant - including a huge compression type refrigeration equipment - has been installed to speed up production and in accordance with improved standards of hygiene, every precaution is taken during production to ensure that the ice is of the highest quality obtainable.

Consumers of fresh ice are highly critical in their requirements and for the most part insist upon their ice being not only pure but free from discoloration and opacity. To this end the water used in the ice-making process is subjected to careful treatment which includes lime removal, chlorination and aeration; the latter being carried out during actual freezing.

The water used in the Carlo Gatti plant is drawn from the Metropolitan Water Board's main supply. Whilst having a high standard of purity as regards drinking water requirements this water produces an ice with a pronounced yellow tinge if untreated. This discoloration is caused by the presence in the water of lime, in the form of dissolved calcium carbonate.

The Permutit Co. Ltd., London, were commissioned to provide water softening equipment for the removal of the lime and the plant installed for this purpose consists of a Permutit type DL ion exchange softener handling a flow of 3,000 gallons of mains water hourly. The softener is charged with 'ZEO-KARB' 225: a polystyrene resin material in bead form which softens the water to commercial zero hardness by effecting removal of the calcium ions from the dissolved lime. The softener is regenerated once daily with brine and for this purpose a combined salt saturator and measuring tank is placed alongside the softener. After passing through the softener the water is chlorinated in order to sterilise it; thus, before being made into ice the water is rendered free from lime and bacterial matter.

The softened and sterilized water is pumped to a large, enclosed treated water storage tank on the roof of the building. By this means a continuous supply of treated water is ensured against the possibility of a breakdown and also to permit continual draw off during regeneration of the water treatment plant. From the storage tank the treated water flows by gravity to a pair of 1,478 gallon filling tanks. These two tanks are each divided into twenty-two compartments which are of the same capacity as the containers in which the ice blocks are made. The containers are of galvanised steel construction and rectangular in shape - approximately 3ft x 2ft x 1ft each; they are arranged in rows of twenty-two in lifting cradles of strong steel construction.

An alternating valve filling device transfers the water from the filling tanks to a cradled row of twenty-two containers and when these are full an overhead travelling gantry crane lifts the cradle and lowers it into a large brine tank for freezing. These tanks occupy a considerable floor area and can accommodate a large number of cradled containers. The tanks are about 4ft in depth and brine is kept circulating through them continuously by means of large electrically operated propellors at one end; at the other end, the brine flows over weirs into collecting troughs where it is pumped back through pipes below the tanks. Large coils of piping, containing pressurised ammonia gas, are immersed in the brine and arranged so as to interweave between the rows of containers. The temperature in the brine tanks is maintained at an average of 19 degrees Farenheit.

The containers are left immersed in the cold brine for forty-eight hours, during which period the water inside the containers slowly freezes. For the whole of the forty-eight hour freezing period the water in each container is kept continuously aerated by low pressure compressed air delivered by flexible pipe lines connected to each row of containers. This process slows down the rate of freezing but ensures that the ice formed is of crystal clarity. Still

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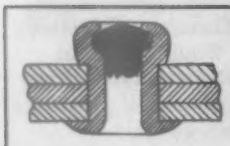

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water left to freeze would form an opaque ice similar to that found in the cube trays in domestic refrigerators. Aeration has a 'scrubbing' effect on the face of the slowly forming ice and keeps it clear by effecting removal of the tiny particles of residual matter remaining in the water after treatment and rejected at the moment of freezing.

As aeration proceeds and ice slowly forms inside each container, the volume of bubbling water is gradually reduced until it is no more than a narrow hole down through the centre of each block of ice; this is termed a 'core'. Aeration is continued until the core is reduced in diameter to about $\frac{1}{2}$ inch when aeration is stopped and the water in the core removed by suction apparatus. This is necessary since the water in the core is turbid from a high concentration of residual matter kept from freezing by the aeration process. The empty core is filled with freshly softened and sterilised water which, of course, is clear and on being left to freeze integral with the rest of the ice block is invisible since any resulting opacity is negligible. Freezing the ice into solid blocks in this way is essential otherwise removing the ice from the containers would be made more difficult.

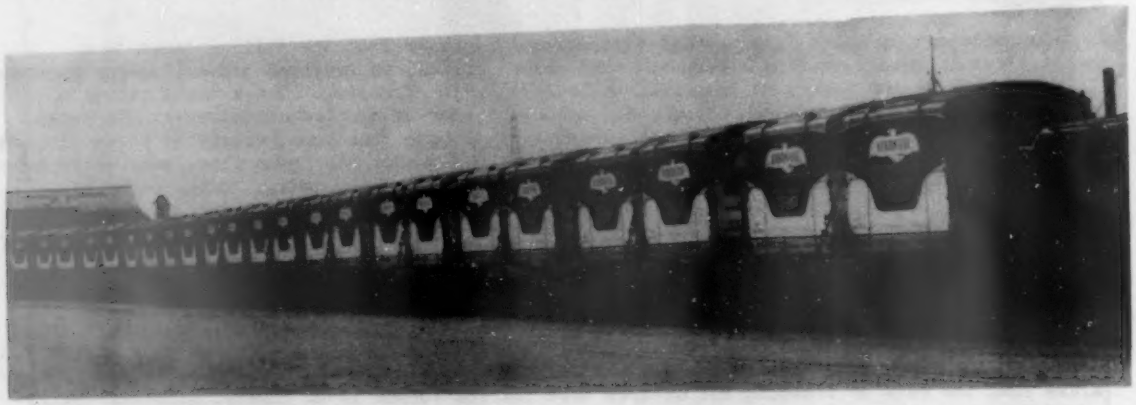
When all the blocks inside a complete row of containers are frozen solid the cradle is lifted out of the brine tank by crane and transferred to thawing tanks containing tepid water. After a few moments immersion in the warm water the ice around the inside edges of each container melts allowing the blocks to pop up and float - still within the container - upon the water formed by the melting ice. As soon as all the blocks have freed themselves in this way the cradle is lifted out of the thawing tank and lowered to the floor below. Here the cradles are tipped sideways to send a row of twenty-two blocks of ice - each weighing 3 cwt - cascading down a ramp to the despatching bay.

Here the blocks of ice are manhandled expertly onto waiting lorries or placed into ice breaking machines which crush or chip the ice to any size required; the crushed ice is weighed into bags of a porous nature for loading on to vehicles.

The daily output from the firm's Battersea plant is in excess of 85 tons of which the greater part goes to meet the needs of Billingsgate Fish Market and many of London's hospitals, hotels and restaurants as well as industrial consumers. Among the last mentioned are manufacturers of fine chemicals, paints and sausages. Large quantities of crushed and block ice are also delivered to British Railways for use in restaurant and Pullman cars and for packing insulated freight vans conveying such perishable foodstuffs as meat, fish, fruit and vegetables.

Freedom from colour and clarity are two highly important selling factors with factory-made ice but where these are present it has been found that discoloration is the more objectionable. By its lime freeing action, therefore, Permutit ion exchange softening plant plays a major role in providing the world's largest city with a daily supply of fresh ice which is pure, clear and colourless. x x x

BIRDS EYE "FROZEN TRAIN" - Holiday crowds gathered at The Quayside, Great Yarmouth, last month to see the Mayor, Councillor E.W. Applegate, flag off a complete train-load of refrigerated rail containers carrying 160 tons of Birds Eye quick-frozen peas. The long train, only partly shown here, was drawn up in the street beside the River Yare.



"PROGRAMME OF FREE RADICALS RESEARCH"

The U.S. National Bureau of Standards is currently engaged in a 'Programme of Free Radicals Research' in which emphasis is placed on temperatures in the region of 77° down to 1°K. Maintaining these temperatures, where the highly reactive molecular fragments are stabilized, requires the use of liquefied gases. Each week the 'Programme' uses approximately 100 litres of liquid helium, 800 litres of liquid nitrogen, and 50 litres of liquid hydrogen - quantities it is not always feasible to produce at the Bureau.

Purchasing liquefied gases from commercial sources and even, when necessary, transporting them over long distances has provided a solution to the problem which is both economically acceptable and dependable.

The Bureau has coupled with this approach to procurement a plan which frees research scientists from the time-consuming details involved in handling low-temperature liquids. The system, which has been operating successfully for over two years, provides over-all economy and accelerates research. Under this plan, instead of the scientist transferring the liquid himself, personnel trained in the operation of low-temperature apparatus deliver the liquid refrigerants to the experimenter on a scheduled basis as they are needed. This specially trained staff, headed by A.K. Stober with the assistance of M.C. Jones, is also responsible for the procuring, storing, handling, and transferring of low-temperature liquids, including hydrogen, helium, nitrogen, and oxygen.

A supplement to the liquid-helium supply available at the U.S. National Bureau of Standards, Washington, was found in the liquefaction facility operated by the Bureau's Cryogenic Engineering Laboratory in Boulder, Colorado. Difficulties such as Dewar damage, vibration, and sloshing, which arise in trunk or rail transporation over long distances, are now eliminated by flying the helium between Denver and Washington. Over 90 trips have been completed to date, providing a regular and dependable supply of helium. Transportation adds only a fraction to the cost of the liquid helium, the most expensive of the low-temperature liquids used. Losses for each 50-litre Dewar during the 1700-mile flight amount to only 1 to 2 litres.

To meet the demand for liquid hydrogen, a commercial source was located. High-purity para-hydrogen is shipped directly to the Bureau without nitrogen shielding in special pressurized Dewars, in which it can be stored if an immediate transfer is not convenient. The hydrogen is shipped by a specially built grounded truck, on a week's notice, in 100-litre quantities. Transporting the hydrogen over a 500 mile distance increases the price by about one half. The loss rate during shipment is about 3 litres per day.

Liquid nitrogen now a relatively inexpensive refrigerant, is also purchased commercially. Individual 50-litre containers are delivered directly to requisitioners - a scheme which eliminates extra handling. To provide a continuous supply between deliveries, which are made on 24 hours notice a large quantity of nitrogen, from which scientists make their own transfers, is stored.

Between procurement and delivery to individual laboratories, the nitrogen and the helium supplies are housed in a central storage area. This facilitates the nitrogen-shielding of helium Dewars, limits the amount of handling required, controls the frequency of transfers, and permits a closer check on equipment. Hydrogen, because of its hazardous nature, must, of course, be housed separately.

x x x x

The first National Frozen Foods and Quick-Freezing Exhibition and Convention will be held in the Old Hall of The Royal Horticultural Society, London, S.W.1., from October 6 to 9, 1959. The director and organizer is Mr. W.R. Kern, 40, Gerrard Street, London, W.1. The thousands of smaller retailers who will be visiting the exhibition will have the opportunity of winning free a "famous name" frozen food cabinet, purchased by the organizers and to be presented under a scheme of which more details later.

FUTURE PROSPECTS FOR THE ENAMEL INDUSTRY

In talking about the future prospects of the vitreous enamelling industry at the 15th Ferro Refresher Course recently, Mr. S.W.Vickery, managing director of Ferro Enamels Limited and chairman of the Vitreous Enamel Development Council, stated that at first sight it seemed assured. He went on to say that the industry's task should be easy with a material such as vitreous enamel which provided the following advantages.

1. Beauty that is permanent.
2. Colours that do not fade.
3. Freedom from rusting, staining, scratching, burning.
4. A surface that is as easy to keep clean as a china.
5. Life-time durability.

These properties mean real quality, and make up a perfect material as a finish for the many domestic appliances in every day use in the home.

Mr. Vickery said that in order to compare the present and potential market for appliances it should be noticed that there is a distinct relationship between the sales of domestic appliances in the United States and in Great Britain, as indicated in the following comparison.

U.S.A.SALES OF DOMESTIC APPLIANCES

(Population - 166 million)

	Year(1957)	Year(1958 projected)	
Electric ranges f.s.	952,812	782,325	-17.89
Gas ranges	1,714,617	1,508,562	-12.02
Washers - auto & semi.	2,707,463	2,380,704	-12.07
Dishwashers	373,977	371,412	-00,68
Refrigerators	3,628,278	3,017,637	-16.83
Gas water heaters	2,608,605	2,658,879	1.93
		Percentage decline	-10.56

Above figures for 1958 are projected and reflect the recessional fall off of national sales.

U.K.PRODUCTION OF DOMESTIC APPLIANCES

(Population - 55 million)

	Year 1957	Year 1958	
Electric cookers	331,753	340,139	2.53
Gas cookers	537,300	626,367	16.58
Washers - electric	667,264	875,988	31.28
Refrigerators	358,438	562,237	56.86
Gas water heaters	208,000	210,000	.96
		Percentage increase	24.34
Houses completed	307,600	257,600	

Mr. Vickery went on to say that it was interesting to note further that if one took the United States and British populations, which are approximately 3 to 1, the total appliances were in the same order. Except for the recession in 1958, the American sales of appliances increased at an average rate of approximately 15 per cent. The British figure indicated a comparable increase.

"One might deduct from this that with the ever-changing habits of peoples, the rate of home formations, and the improved standard of living, a corresponding increase in their demands for household appliances and utensils could be expected."

He went on to say that it was estimated that the appliance industry accounted for somewhat over half the consumption of vitreous enamel. One could only conjecture that either more enamelled parts of appliances were being processed, or replacing the volume lost to other materials, because there was a steady increase in the consumption of enamel. No reliable figures had been produced to date to indicate the actual percentage swing over from one material to another, although evidence indicated that the refrigerator industry was using more and more plastic material for liners. "We might seriously ask the question - Did we lose ground or gain ground", said Mr. Vickery.

Two independent surveys conducted recently in the United States among 6,000 representative appliance dealers showed a strong preference for vitreous enamel, as shown below, for the following appliances.

For Exterior Application	Baked Finish	Vitreous Enamel
Clothes washers	28.3	64.8
Clothes dryers	35.1	56.7
Home freezers	58.7	25.9
Refrigerators	53.0	37.9
Gas and electric ranges	9.2	81.5.

For Interior Application	Baked Finish	Vitreous Enamel
Clothes washers	4.1	77.3
Clothes dryers	8.1	60.4.
Home freezers	6.8	51.5
Refrigerators	5.6	82.6
Gas and electric ranges	5.1	78.9

Additional to this preference, the survey showed that vitreous enamel had fewer dissatisfied consumer users by a 3 to 1 margin.

	Percent dissatisfied with finish	
	Baked Finish	Vitreous Enamel
Refrigerators	20.3	6.7
Food freezers	14.8	5.8
Clothes washers	20.9	5.7
Clothes dryers	14.2	4.8

"This apparently satisfactory and encouraging picture", said Mr. Vickery, "is marred by the disturbing fact that although most consumers prefer and like vitreous enamel, other consumers were unable to answer the following question: "What type of finish do you think your appliances have?"

	Total Respondents	Don't Know No Answer	Per Cent of Total
Refrigerators	1,729	309	17.9
Food freezers	444	90	20.3
Clothes washers	1,307	259	19.8
Clothes dryers	353	62	17.6

Other consumers reported the following finishes as being on their appliances:

	Baked Finish	Vitreous Enamel
Refrigerators	687	679
Food freezers	203	134
Gas and electric ranges	433	816

"This table shows," stated Mr. Vickery, "that more than half the people do not know whether it is vitreous enamel or a baked finish, and although dealers stress the importance of finishes - as over 55 per cent considered the finish is very important and it was reported that approximately 68 per cent usually point out the advantages of the type of finish on the appliance - some dealers were confused and incorrect in their identification of exteriors of best selling appliances."

He went on to say that there was something everyone could do to correct that state of affairs, which check surveys indicated a similar lack of knowledge as to the identification of finish on products.

"I believe," said Mr. Vickery, "the first thing is that the finish should be clearly identified, that it is "Genuine vitreous enamel", and the label should indicate the salient features of the finish.

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SELF-SERVICE EXPANSION

The latest food shop to open in Stevenage (Fine Fare and Sainsbury's opened previously) is Maypole Diary Co. Limited's latest venture into self-service.

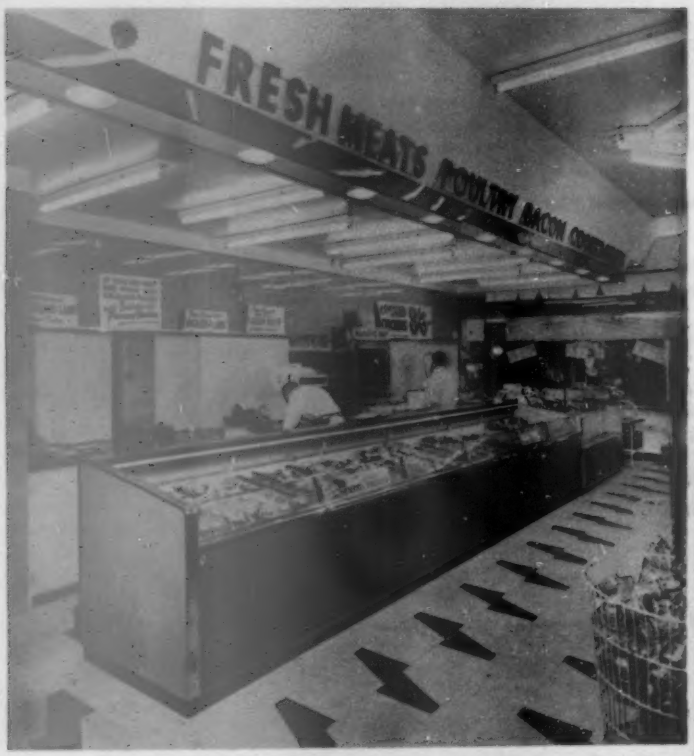
The shop stands on the corner of one of the wide paved walks and presents a virtually all-glass frontage on both sides with a stone-and-ironwork recessed main entrance. Provision is made in this recess for a small pram park. Shoppers enter the store through either a four-door main entrance or a single side door, with which is combined a one-way turnstile. After passing through the four check-outs situated on the left of the main entrance, they leave the store through a separate exit beside the main entrance.

The store, seen from the main entrance, comprises movable three tier wall gondolas running along the side window, the opposite wall being occupied by standard six-shelf wall shelving. 2 three tier island site gondolas are situated on either side of the main island side of Frigidaire Manhattan open top display cases.

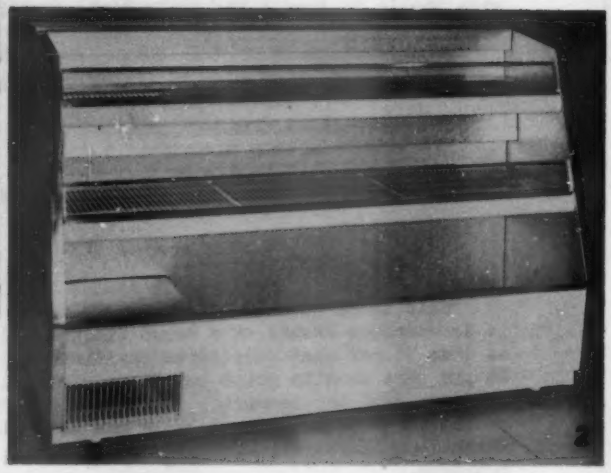
Across the end of the store is a run of Frigidaire Manhattan open top cases for the display of meat, and in the left hand corner is the market garden section.

The Frigidaire island site, finished in pale blue to contrast with the off-white vinyl floor with its brick red and grey motif, consists of two continuous 18' runs back to back. These comprise on one side a 12' dairy display case and a 6' display case for sausages, and on the other side a 12' cheese display case and a 6' frozen foods storage and display case.

In addition, there are 36' of chilled shelf display area for cheeses, fats and other produce



1. Frigidaire cabinets at the Maypole Dairy's new premises at Stevenage (see previous page)



2. The new Swedish IWO cabinet (see opposite page)

3. At the "Royal", Prestcold showed this new Smithfield/McCray cabinet

4. One of the new Hussmann Slimline models described last month

running along the top of the island site.

At the back of the store an 18' run of Frigidaire open top cases for meat display, with special refrigerated storage built into the back of the cabinets, is finished in sea green. Behind the meat case is the preparation room, and at the back of the premises are two Frigidaire cold rooms, one of 100 cu. ft. and one of 500 cu.ft. The former is for provisions, and the latter for the storage of prepared meat. In addition there is a Frigidaire conservator, model KFR-137, providing additional storage space. The 500 cu. ft. cold room is fitted with electrical defrosting equipment.(see opposite page).

x x x x x

FROZEN FOOD STORE OWNERS MEET IN BERKSHIRE

Breaking away from their usual rendezvous in the eastern quarter of the country, members of the Association of Frozen Food Stores met last month in Newbury, Berkshire. This was at the invitation of a new member, Mr. E.H.Bonnett, managing director, Deep Freeze Facilities Ltd., Shaw Mill, Newbury.

Luncheon was partaken at the Hare and Hounds, Speen, a mile out of the town, and then an informal meeting took place under the chairmanship of Mr.I.M. Ferguson, Louth. Messrs. Davies (Cambridge), Hooper and co-director (Oxford), Major-Lucas (Northampton), Bonnett and Commander Havergal (Newbury) and the editor-in-chief, Frozen Foods, were present.

Many matters of common interest were discussed in the Association's usual informal atmosphere which allows a very free exchange of opinion. One topic was the correct handling of black currants, a crop that was in full flush at the time. Storage charges were also a matter that was dealt with.

The afternoon was rounded off with a visit to the food bank of Deep Freeze Facilities. Shaw Mill is a delightful building that has now been converted to its new purpose; situated as it is beside a fast-flowing stream it is creating considerable local interest, not only as a storage plant, but on account of its scenic beauty. The chilling and freezing sections are now in use and poultry handling is likely to be the next activity to be undertaken.

The next quarterly is to be held in Cambridge; the date is to be advised.

COMMERCIAL AND INDUSTRIAL SECTION.

The recent offer by Crane Packing Limited of Slough to supply free for trial both specimen gland packing assemblies and flexible packing extractors - the latter designed to facilitate and to improve the efficiency with which the glands of pumps, etc., are repacked - is now followed by an announcement about six new additions to the Crane range of gland packings. Of these six new gland packings five are additions to the Crane CF2 range, that is to say, in their manufacture Polytetrafluoroethylene (PTFE) is used as the basic material. Three of these new CF2 gland packings are impregnated, as part of the manufacturing process, with PTFE dispersion coatings. In addition the company is also introducing a new packing in the CRANPAC series; this packing has been developed for applications involving the handling of steam, air, water, mineral oils, petroleum by-products and gases at high temperatures.

x x x x x

Rubazote insulation tubing, made by Expanded Rubber Co. Ltd. of Croydon, is used very extensively by A.B. K.J.Levin of Malmo, Sweden, in the manufacture of their frozen food display cabinets. Rubazote, a form of soft expanded rubber, has remarkable resistance to moisture penetration and a high degree of thermal insulation, as each of the minute cells is sealed and contains an inert gas.

x x x x x

The booklet "Refrigeration in the Home" was recently produced as a supplement to the bulletin issued by the Watson House Centre of the Gas Council which is concerned with the design, testing and development of appliances. This supplement was produced primarily for internal information and use within the industry and copies are not, therefore, available to the general public. As a useful summary dealing with the need for refrigeration, the various designs and types of absorption type refrigerators available, and the installation, maintenance and use of these appliances, this new booklet is a worthwhile acquisition.

x x x x x

M.L.Winsor & Co., Ltd., 56, Haymarket, London, S.W.1., are handling in this country the Swedish IWO Frys commercial refrigeration equipment. This includes merchandisers, farm freezers and refrigerated display cases produced by Elektro IWO AB. All models are fitted with U.S. manufactured Tecumseh sealed condensing units, Ranco thermostats and the units are covered by a five-year guarantee. Stocks of machines and spare parts, including units, are held in London against distributors' requirements. Twenty-two distributors in the U.K. and Channel Islands have been appointed and sales have been going extremely well, it is learned.

Mr. Kenneth Preston in his review to shareholders of Stone-Platt Industries Ltd., upon the company's affairs for the year ended 31st December 1958, said, in part: "I should explain that previously the company was called Platt Brothers and Company (Holdings) Limited, but as a consequence of the merger with J. Stone & Company (Holdings) Limited the name has been changed to Stone-Platt Industries Limited.

"We are continuing the policy of broadening our activities. In conjunction with Carrier Corporation of Syracuse, New York, we have formed a new company - Carlyle Air Conditioning and Refrigeration Limited. Carrier Corporation is the largest manufacturer of air-conditioning apparatus in the world, with a turnover last year of 90 million pounds, and, amongst other famous buildings, it has supplied the equipment for the Pentagon in Washington, D.C., and the United Nations building in New York. It has also installed air conditioning and refrigeration equipment on passenger and cargo vessels of many countries. It will be air-conditioning the new Chase Manhattan Bank building in New York, also the Savannah - the first nuclear-powered passenger cargo vessel. Practically all of the atomic submarines of the United States Navy will also be similarly equipped. It is anticipated that this link with Carrier Corporation will in due course bring substantial additional turnover to our subsidiary companies.

"In association with Carrier Corporation we have also purchased the Winsor Engineering Company Limited of Glasgow, which for many years has specialised in the installation of air-conditioning, ventilating and refrigeration equipments on board ship. With the co-operation of Stone-Platt and with Carrier Corporation's wide experience and installation techniques available to them, Winsor Engineering will continue to operate in this field, together with its other manufacturing activities.

x x x x x

Now available from British manufacture is the Joy-Sullivan WN.112 two stage V-vertical stationary compressor, which is being produced by Joy-Sullivan Ltd., air power division, of 7, Harley Street, London, W.1. Already a popular and well tried machine in the U.S.A. and other parts of the world the WN.112 provides minimum adjustment and maintenance, high overall efficiency, long service life and compactness for small foundation. Four variations of the compressor will be available offering a choice of capacity from 400-850 cu.ft. per minute free air delivered. Operating at the relatively low speed of 600 r.p.m., they provide a delivery pressure of up to 125 lbs.p.s.i. The V-vertical construction of the WN.112 means that it requires very little floor space. In a number of industries where compressed air is used one of the principal requirements is that the air should be completely oil-free. Food preparation, confectionery and certain chemical processes have this problem. The WNO-112 compressor provides the answer. It is a special version of the WN.112. The WNO-112 has carbon graphite piston bearing and sealing rings in place of oil lubrication in the cylinders.

x x x x x

Officials of the Amalgamated Union of Foundry Workers and the National Union of General & Municipal Workers were invited recently to inspect new foundry amenities and equipment recently installed at the Newark works of Worthington-Simpson Ltd. The foundry amenities comprise showers, wash-basins, lead-light mirrors, footbaths, and provision for dirty and clean clothes which are safe-guarded by padlocks with individual keys. The installation has cost £10,000 and has been designed in consultation with representatives of the 180 foundry workers for whom it caters. The rooms are tiled throughout to facilitate hygiene in general and easy washing down in particular. Water is supplied at a controlled temperature of 110° F, and no effort has been spared to ensure that these new amenities offer a complete service for the foundry workers - including the provision of sockets for electric razors. Staggered hours permit easier use of the amenities, and a pilot scheme was operated for a few weeks to iron out possible difficulties. These welfare improvements come side by side with the new foundry scheme which does away with dust and fumes thus providing a much cleaner working atmosphere.

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A new catalogue has lately come to hand from Zero Electric Limited of 39a, Bath Road, Walsall, copies of which are obtainable by the trade therefrom. This brochure could aptly be called an "A to Z" list of components so wide is the selection carried by this midlands wholesaler.

x x x x x

Turnover of the Cape Asbestos Group increased eight per cent in 1958, states Mr. Giles Newton, chairman of The Cape Asbestos Company Ltd., in the annual report published recently. Cape Asbestos produce raw asbestos from their mines in South Africa and their principal manufactured products are 'Caposite' asbestos thermal insulation materials, 'Rocksil' rock wool insulation, 'Asbestolux' asbestos insulation board, 'Marinite' asbestos sheet, and 'Capasco' brake and clutch linings.

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x x x x x
x x x x x

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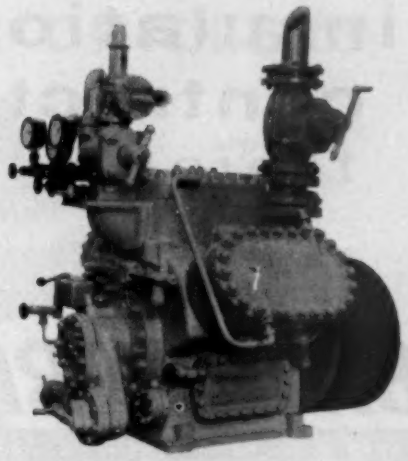
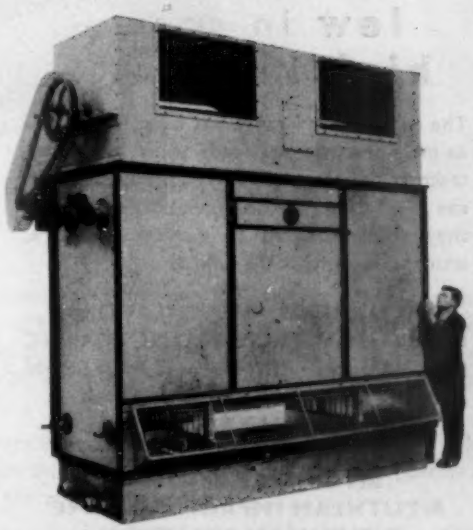


Model A56
Ammonia Compressor



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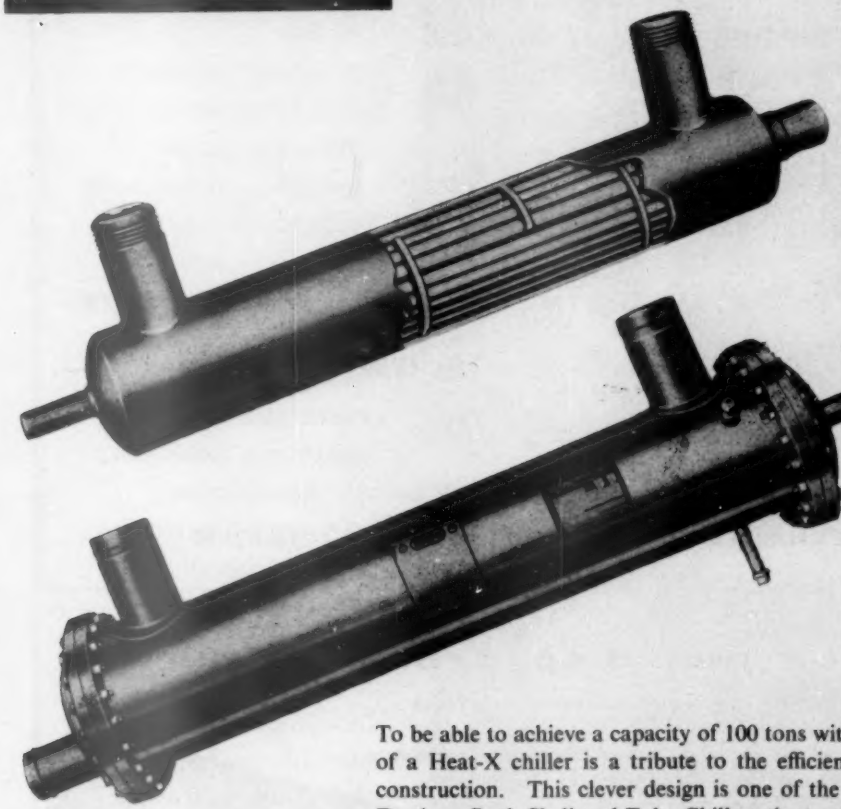

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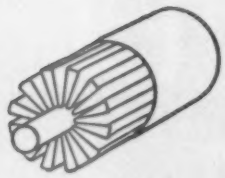

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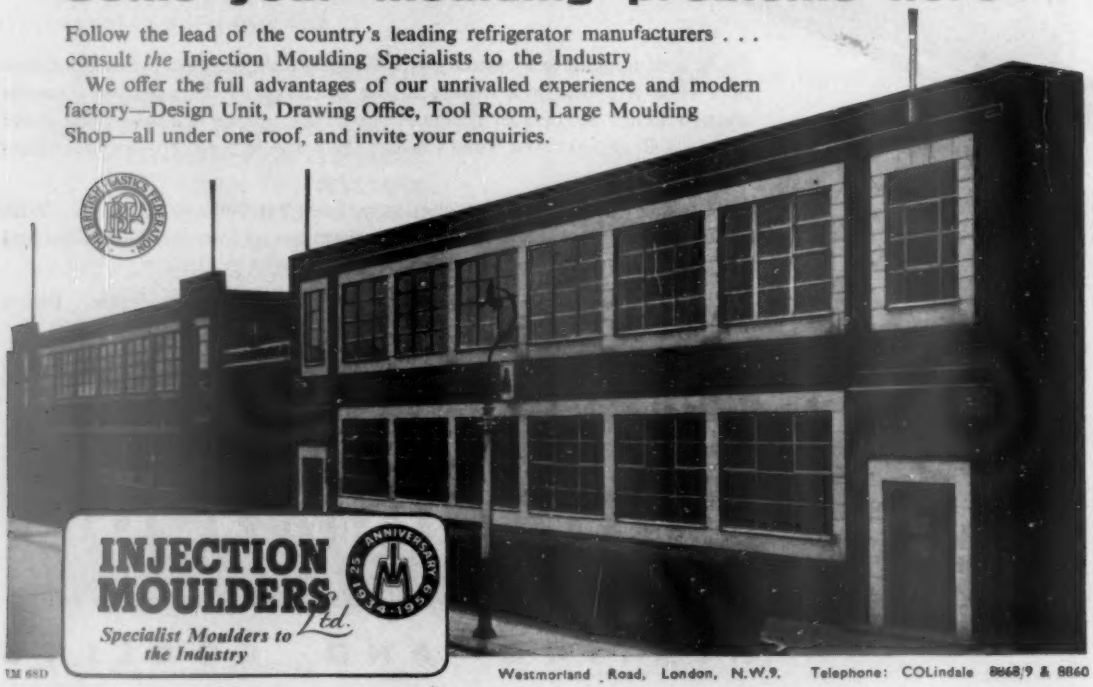

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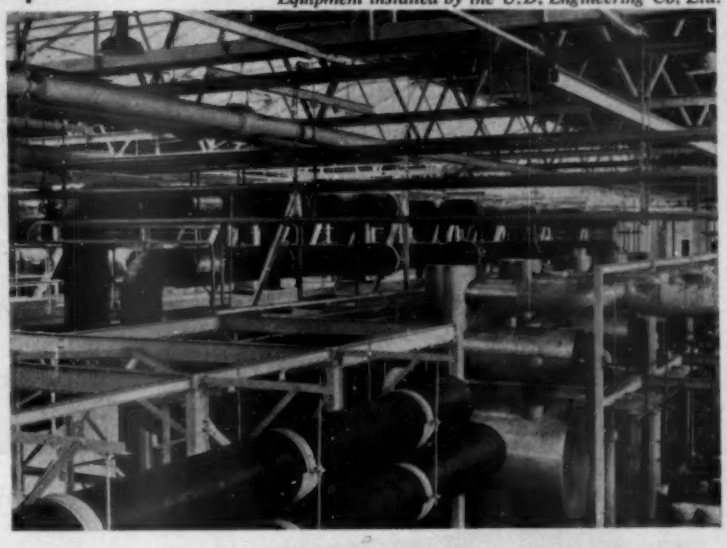

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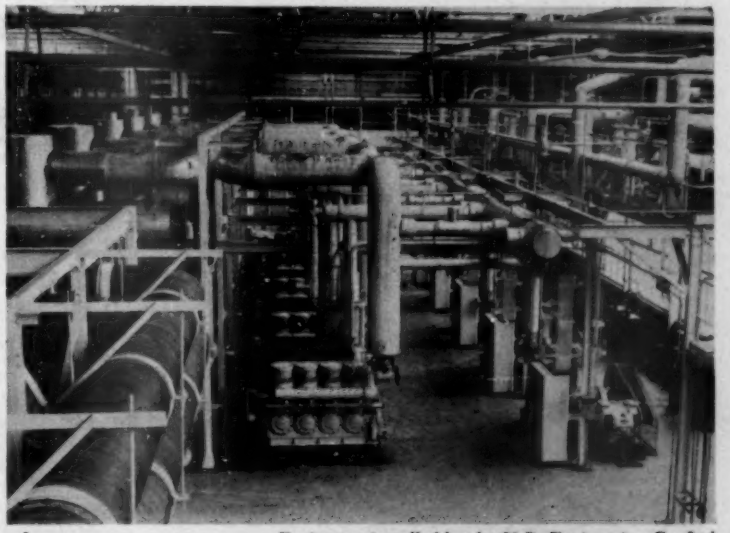

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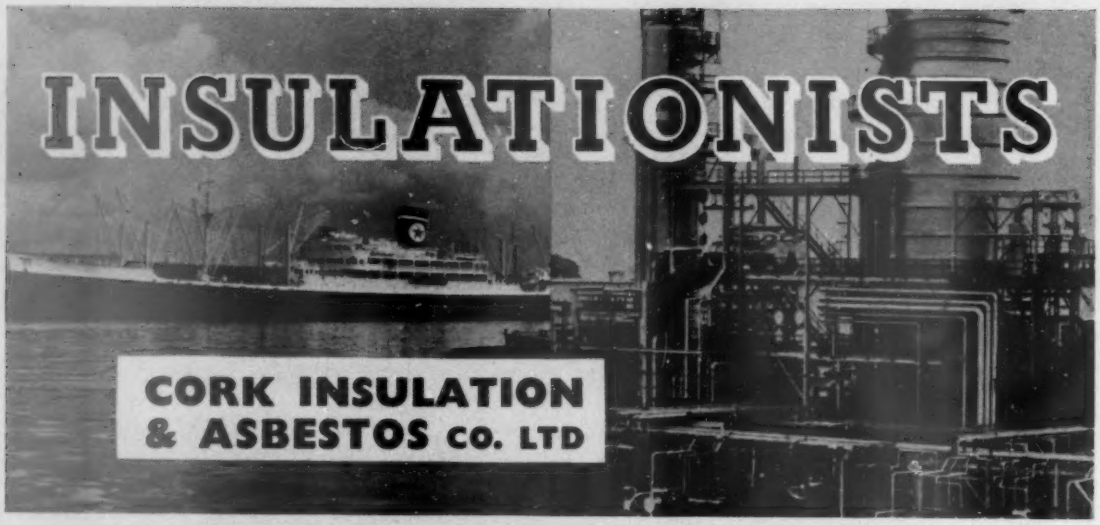

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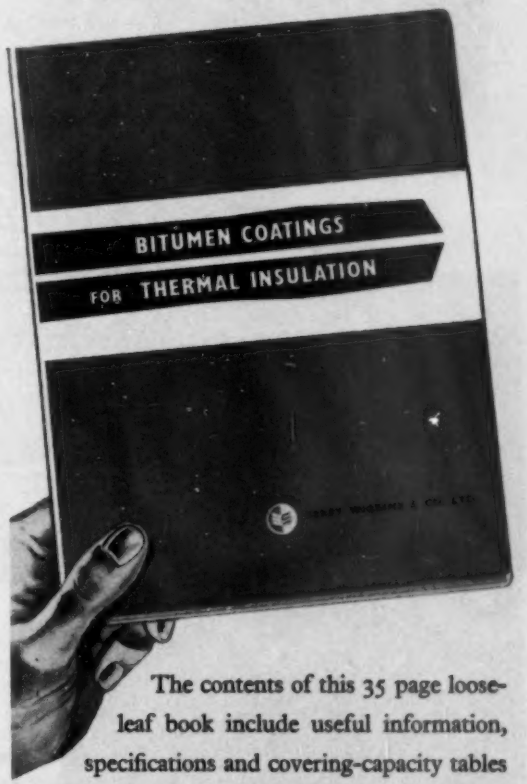

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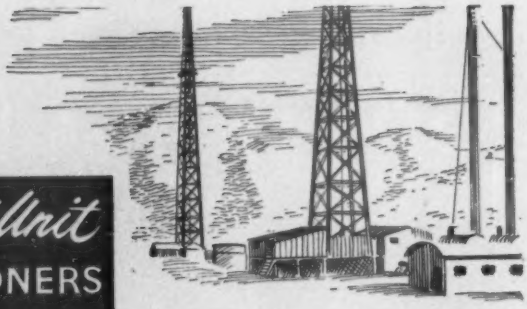

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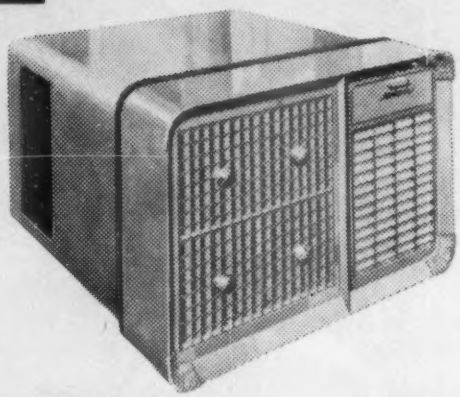

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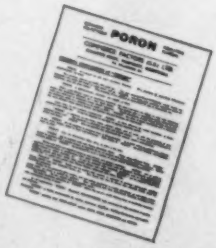

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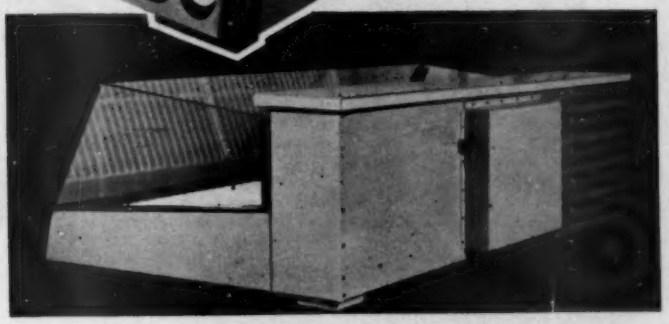

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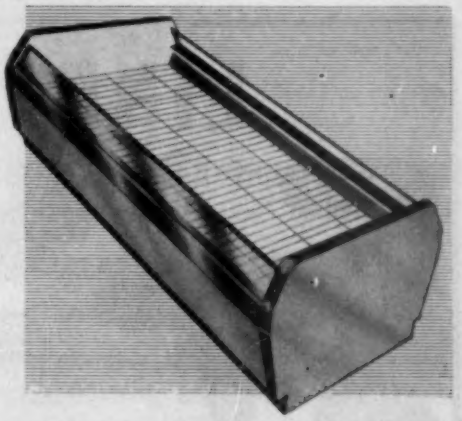

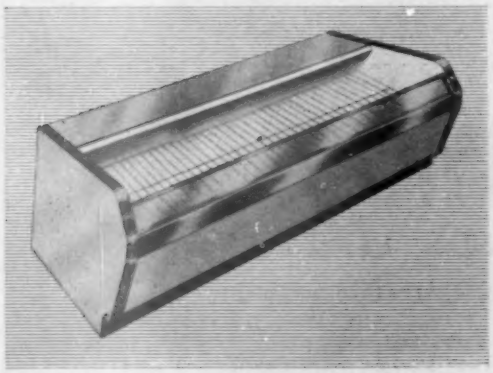

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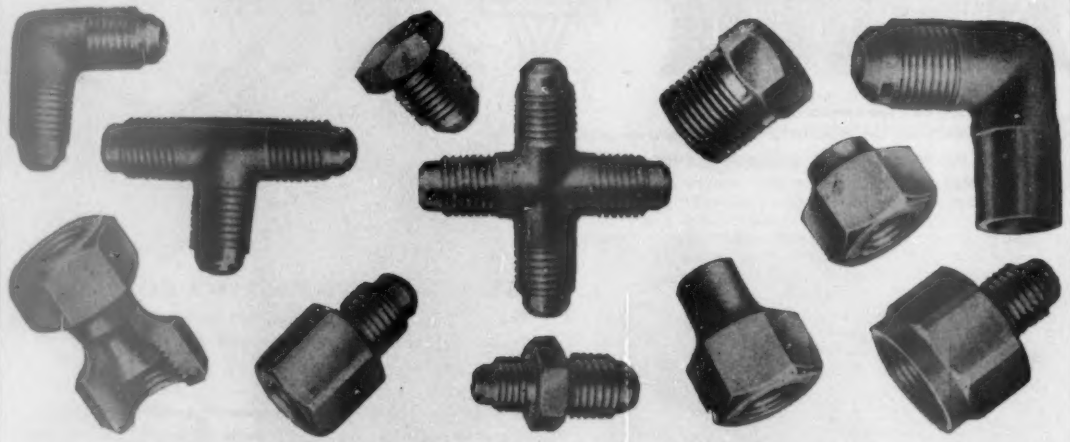

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The photograph shows two compressors out of six in a two-stage installation serving a number of ice-cream hardening tunnels. The premises are those of Messrs. Nielsons (Ice Cream & Frozen Foods) Ltd., by whose courtesy this photograph is reproduced.

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INSULATION and COLD ROOM DOORS for all cold storage and low temperature applications.

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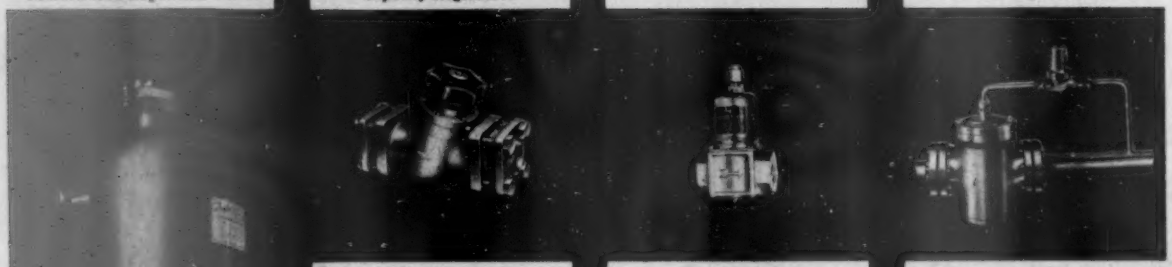

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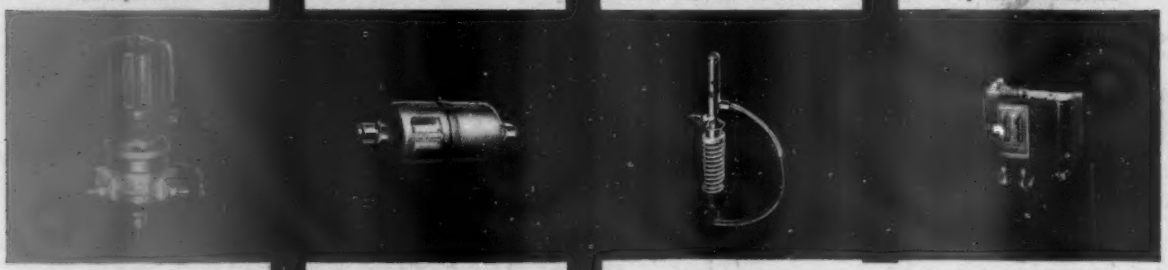

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